How EU Markets Became More Competitive Than US Markets: A Study of Institutional Drift*

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Abstract

Many European markets today appear more competitive than their American counterparts. We document this surprising reversal of history and propose an explanation. Our model of political support predicts that a supranational regulator enforces free markets beyond the preferences of any individual country. We find that European institutions are indeed more independent and enforce competition more strongly than any individual country ever did. Countries with ex-ante weaker institutions benefit more from the delegation of competition policy to the EU level. Our model also explains why political and lobbying expenditures have increased more in America than in Europe.

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For more than a century American markets have been freer and more competitive than those of other nations. The United States invented modern antitrust in the late nineteenth and early twentieth century. By 1950 it was clear to most observers that American markets were less concentrated that European ones.[1] The United States later led the way in the deregulation of important industries such as Airlines (1978) and Telecoms (1984). The American free-market doctrine spread globally during the 1980's and 1990's, and by the late 1990's a broad international consensus had emerged among policy makers in favor of US-style regulations. Alesina and Giavazzi (2006) captured this common wisdom when they wrote that "*If Europe is to arrest its decline [..] it needs to adopt something closer to the American free-market model.*"

We argue that much has changed since then. We show that Europe has heeded the advice of policy makers and academic economists. It has set up the world's most independent antitrust regulator and it has systematically deregulated many of its markets. In fact, according to most measures, European markets are now more competitive than their American counter-parts. Figure 1 shows that US markets experienced a continuous rise in concentration and profit margins starting in the early 2000s while EU markets did not experience these trends.[2] US profit margins used to be lower than European ones, but a reversal took place in the mid-2000s. Profit margins in Europe in 2015 are similar to profit margins in the US twenty years earlier.

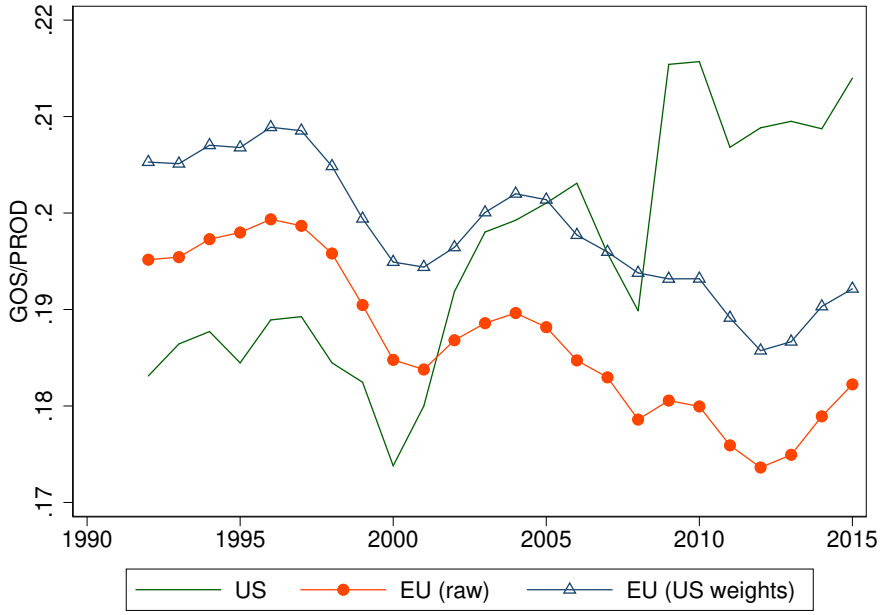
Profits and concentration are endogenous variables, however, and need to be interpreted with caution.[3] We discuss a host of other indicators in the next section of the paper – including direct comparisons of prices – but it is important to clarify that some trends are unambiguous. There is no doubt that Europe has deregulated many of its markets and that it has improved its antitrust enforcement. Figure 2 shows the average number of product market reforms implemented by European Countries. Reform efforts increased significantly in the late 1990s and early 2000s. We are most interested in those reforms that reduce barriers to entry. Consider for instance the cost of starting a new business. Djankov et al. (2002) report that it took 53 days to begin operating legally in France in 1999. By 2016, this number was down to only 4 days. Over the same period, the entry delay in the US went up from 4 days to 6 days. This is not an isolated indicator. The OECD's Product Market Regulation indices (discussed later) show clear decreases in regulations in all EU countries over the past 20 years.

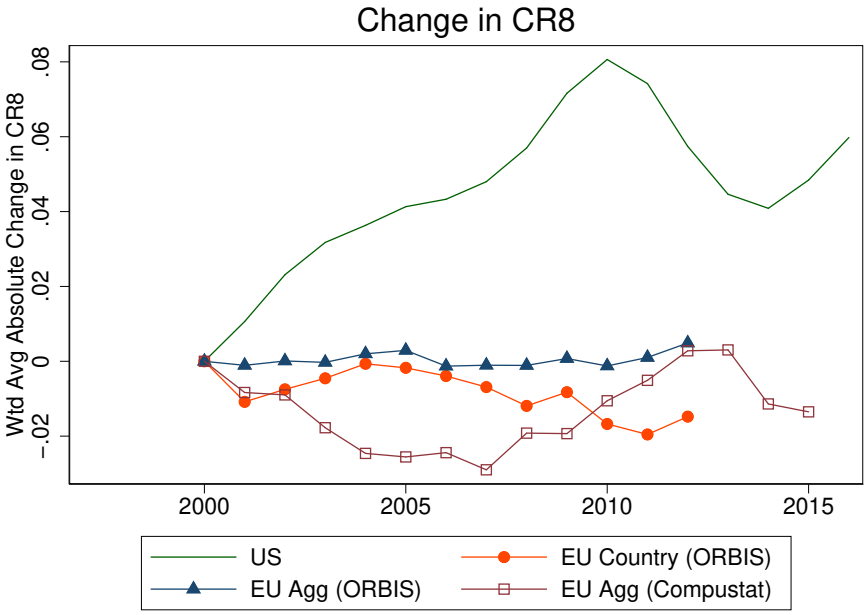
[1] For instance, Jean Monnet writes in his Memoirs (1978)*: "The problem was to break up excessive concentrations in the coal and steel industries of the Ruhr [..] The Americans had been the first to tackle the problem, many months earlier. Their economic and political philosophy would not tolerate either the practice or the apparatus of domination, at home or abroad."*

[2] See Autor et al. (2017a) for a longer time-series of US census-based concentration measures under a consistent segmentation. The series in Autor et al. (2017a) exhibit similar trends: concentration begins to increase between 1992 and 1997 for Retail Trade and Services, and between 1997 and 2002 for the remaining sectors. Measuring concentration in Europe is more challenging than in the US, in particular because it is difficult to decide on the appropriate level of consolidation. Bajgar et al. (2019) take into account that some firms are part of larger business groups. When they measure concentration at the business group-level within 2-digit industries they find a moderate increase in concentration in Europe, with the unweighted average CR8 increasing from 21.5% to 25.1%. In North America, CR8 increases from 30.3% to 38.4%. Finally, measures of concentration based on broad industry codes differ from those used in actual antitrust cases, because an "industry" is usually much wider than a "market". We discuss the controversy regarding these measures of concentration (Shapiro, 2018) in the next section.

[3] For instance, Covarrubias et al. (2019) explain that concentration and competition are negatively correlated if the data is generated by entry cost shocks, but positively correlated if the data is generated by shocks to ex-post demand elasticities. Syverson (2004) provides an example of the later case. Syverson (2019) provides a critical assessment of the recent literature.

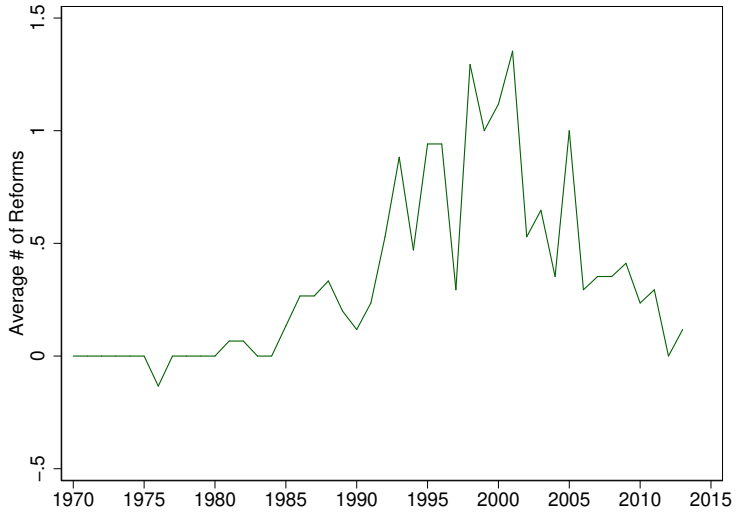
Figure 1: *Profit Margins and Concentration Ratios, US vs. EU*





Note: Annual data. Top chart reports profit margins for Non-Agriculture Business sector excluding RE, from OECD STAN. Red dotted series weighs by EU country x industry gross output. Blue line with triangles first aggregates across EU countries, within industries, using EU country x industry output as weights, then across EU industries using US industry output as weights. Bottom chart reports the real gross-output weighted average of absolute changes in 8-firm CR across industries, from 2000. US Concentration Ratio (CR) based on Compustat. EU CRs based on consolidated financials from Compustat (hollow squares) and unconsolidated financials from ORBIS (circles and triangles), using the data of Kalemli-Ozcan et al. (2015). Country series treat each country as an independent market. Aggregate series treat the EU as a single market. To ensure consistency, all CRs follow the EU KLEMS segmentation and are averaged across industries using the US-share of sales in each industry and year. CRs are adjusted for database coverage using real gross output from OECD STAN. EU concentration includes Austria, Belgium, Germany, Spain, Finland, France, Great Britain, Italy, Netherlands and Sweden. See Appendix A and E for details on the datasets, calculations, treatment of consolidated entities and several robustness tests, including alternate measures of concentration, segment definitions, country samples and data sources.

Figure 2: *Product Market Reforms in Europe*

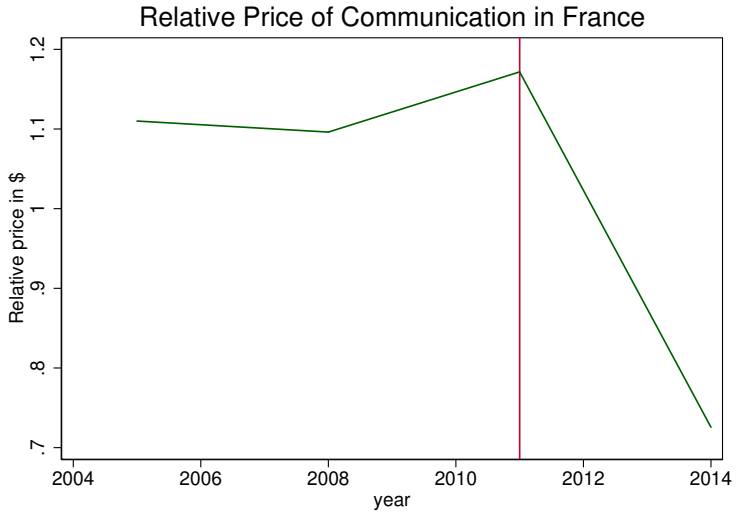


Notes: average number of Product Market Reforms across EU countries, as measured by Duval et al. (2018).

While these policies are clearly documented, two key questions have yet to be answered. First, did these policies have real effects? Second, and most importantly, why did Europe move towards free and competitive markets at a time when the US seemed to be moving in the opposite direction, at least in relative terms? Our paper answers these two questions. First, we document the trends in Figure 1 at a granular level and we use price data to show that mark-ups have indeed decreased in Europe relative to the US. Second, we propose a model to explain why Europe changed its model of market regulation and we test the key predictions of our model using European and American data.

To document the diverging trends between Europe and the US, we first summarize a wide range of measures related to competition at the aggregate-, industry- and firm-level, including concentration, profits, investment (relative to profits and Q) and the labor share. We find that nearly all measures have remained stable in Europe while they point towards declining competition in the US. Industries where concentration increased significantly in the US – such as Telecom and Airlines – did not experience similar evolutions in Europe, even though they use the same technology. Consistent with our emphasis on regulation, we show that Europe has implemented significant reforms in these industries. Finally, we show that prices (controlling for wages and productivity) have increased in the US relative to Europe, precisely in those industries where concentration has risen. To be more concrete, consider the Telecom industry and the entry of the French Telecom company Free Mobile. Until 2011, the French mobile industry was an oligopoly with three large historical incumbents and weak competition. French consumers had to pay somewhere between €45 and €65 per month for their smartphone plans, with limited data and a few hours of talk time. Free obtained its 4G license in 2011 and entered the market with a plan of unlimited talk, messaging and data for €20. Within six months, the incumbents Orange, SFR and Bouygues had reacted by launching their own discount brands and by offering €20 contracts as well. Figure 3 shows the evolution of the price index for communication services (from the ICP database discussed below) in France relative to the US. The vertical line represents

Figure 3: *The Entry of Free*



Source: ICP database. The series is defined as French price index times exchange rate divided by US price index for "communication services". This category is broader than mobile phones plans.

the entry of Free Mobile. The relative price decline was 40%: France went from being 15% more expensive than the US to being 25% cheaper in about two years.

These evolutions are deeply surprising. In the late 1990s the US retained a head-start in antitrust and deregulation, and it had a longer history of independent enforcement. Europe, on the other hand, had a history of state intervention and tight regulations. What happened over the following 20 years would have come as a surprise to most observers at the time. In fact, to the best of our knowledge, not a single one predicted it. The main contribution of our paper is then to propose and test an explanation for these puzzling evolutions.

Our key proposition is that bargaining among sovereign nations in a free-trade area leads to a supra-national regulator that enforces free markets more diligently than what the average politician would have chosen in her own country. Formally, we consider the design of a market regulator and we compare the equilibrium of the game under two structures: national regulator versus supra-national regulator. Policy makers design regulators and choose their degrees of independence. Regulators are then subject to lobbying and political pressures. A fully independent regulator simply maximizes consumer surplus. A less than fully independent regulator can be swayed ex-post by businesses and politicians. We show that the equilibrium degree of independence is strictly higher when two countries set up a common regulator than when each country has its own regulator. The key insight is that politicians are more worried about the regulator being captured by the other country than they are attracted by the opportunity to capture the regulator themselves. French and German politicians might not like a strong and independent regulator, but they like even less the idea of the *other* nation exerting political influence over the regulator. As a result, if they are to agree on a supra-national regulator, it will have a bias towards more independence. Our model therefore explains why, despite their historical mistrust of free markets, Europeans deliberately chose to empower a strongly independent pro-competition regulator at the EU level.

Our model makes three testable predictions:

1. EU countries agree to set up a competition regulator that is tougher and more independent than their previous national regulators;

2. Countries with weaker ex-ante institutions benefit more from delegation to supra-national institutions;

3. Independent institutions decrease the incentives and returns to corporate and political lobbying.

We test these predictions in the remainder of the paper. One plausible theory of European integration is that EU institutions should reflect the (weighted) *average* of member states' institutions. Our theory makes a sharply different prediction. Our model predicts that EU institutions will protect free markets *more than any* member states. We first focus on antitrust – merger and non-merger reviews and remedies – because it has clearly become an EU-level competency. Using indicators of competition law and policy from the OECD and from Hylton and Deng (2006), we show that DG Comp is indeed more independent and more pro-competition than any of the national regulators. In fact, it is more independent that its US counterparts. Consistent with this institutional fact, we show that enforcement has remained stable (or even tightened) in Europe while it has become laxer in the US. We then study product market regulations, which is usually a shared competency between the member state and the EU (see below for details). Once again, we find that the EU has become relatively more pro-competition than the US over the past 15 years. Product market regulations and barriers to entry have decreased in Europe, while they have remained stable or increased in the US.

Next, we show that EU countries with initially weak institutions have experienced large improvements in antitrust and product market regulation. Moreover, we find that the relative improvement is larger for EU countries than for non-EU countries with *similar* initial institutions. Using data across industries and across countries, we show that these reforms have real effects. We show that differential enforcement and product market reforms explain (part of) the relative rise of concentration and market power in the US compared to Europe.

Moving to political expenditures, we show that US firms spend substantially more on lobbying and campaign contributions, and are far more likely to succeed than European firms/lobbyists. Finally, we find no evidence of excessive enforcement in Europe: enforcement leads to lower concentration and profits but we find no evidence of a negative impact on innovation. If anything, (relative) enforcement is associated with *faster* future (relative) productivity growth, although the effects are small.

Literature. Our paper is related to several strands of literature. We discuss key references here, and provide more detailed discussions throughout the paper. Grullon et al. (2019) show that concentration and profit rates have increased across most US industries, and Barkai (2017) estimates profits in excess of required returns on capital. Furman (2015) and CEA (2016) argue that the rise in concentration suggests "economic rents and barriers to competition" but Shapiro (2018) and Werden and Froeb (2018) criticize the use of concentration measures based on SIC or NAICS. Autor et al. (2017a) show that the increase in concentration is linked to the decrease in the labor share. Gutiérrez and Philippon (2017a) and Jones et al. (2019) argue

that declining competition explains part of the weakness of corporate investment while Crouzet and Eberly (2018a) emphasize the role of intangible investment. De-Loecker et al. (2019) and Hall (2018) estimate the increase in markups in the US.

There is much controversy about the interpretation of these trends, particularly as they relate to competition policy. Kwoka (2015) criticizes the weakening of merger reviews in the US over the past 20 years. Vita and Osinski (2016) offer a rebuttal while Kwoka (2017a) maintains the validity of his original claim. Bergman et al. (2010) find that the EU has been tougher than the US in its review of dominance mergers – at least up to 2004. Bailey and Thomas (2015) find a negative correlation between regulation and measures of business dynamism and Davis (2017) argues excessively complex regulations have increased barriers to entry in the US. Faccio and Zingales (2017) show that political factors and regulations explain much of the variations in the price of mobile telecommunication around the world.

Our paper also contributes to the literature on the political economy of institutions. A classic idea from monetary economics is that rules dominate discretion when optimal policies are time-inconsistent (Kydland and Prescott, 1977; Calvo, 1978). Reputation can sustain some rules (Barro and Gordon, 1983) but external commitments can be necessary, such as a conservative policy marker (Rogoff, 1985) or a currency board. Debrun (2001) develops the twin sister argument for the ECB vis a vis the Bundesbank. Faure-Grimaud and Martimort (2003) and Faure-Grimaud and Martimort (2007) argue that regulatory independence can insulate policies from political cycles.[4] Rajan and Zingales (2003) emphasize the role of free financial markets in maintaining a level playing field for competition and innovation. Jabko (2012) shows that the single market was a deliberate political construction and not the by-product of some inevitable process of globalization. More broadly, our paper sheds light on the economic analysis of institutions, pioneered by North (1990) and discussed by Acemoglu et al. (2005). We show how effective enforcement and regulations can drift over time even in the absence of explicit institutional change.

The remainder of this paper is organized as follows. Section 1 further documents the evolution of concentration and profitability in the US and Europe. Section 2 presents our model of regulatory independence, which yields three predictions tested in Sections 3 to 5. Section 6 studies the risk of over-enforcement; and Section 7 concludes. The Appendix provides additional results and discussion for each section, along with a detailed description of the data and process to generate the results.

1 Evidence

This section provides evidence on the divergence in competition policies and outcomes between the US and the EU. We quickly review what is already known before turning to the novel feature of our work: prices. Several papers have discussed the trends in concentration, profits, and labor shares. In Appendix A, we provide a summary table of twenty measures that can proxy for competition. All measures are consistent

[4] Faure-Grimaud and Martimort (2007) explains that "*the European Central Bank remains the most spectacular example of delegation to a new European institution*," but the EU "*has also created a dozen of independent agencies over the last thirty years or so [..] For instance, in the field of merger control, the European Commission was delegated the competence to regulate mergers under the 1989 Merger Control Regulation*." The role of economists within the DG comp has increased during the 2000's, in particular with the creation of the position of Chief Competition Economist in 2003. The position EU commissioner for competition is prestigious, attracts high caliber politicians, and benefits from strong public recognition.

with a decrease in competition in the US, and all are stable in Europe. For instance, the profit share of value added has increased by 5 points and the labor share has decreased by 5 points in the US over the past 20 years, while both are stable in Europe (for details on the labor share, see Cette et al. 2019 and Gutiérrez and Piton 2019). Gutiérrez and Philippon (2017a) study the industries that have experienced the largest concentration in the US: profits, payouts and stock prices have increased in these industries, while investment has decreased. By contrast, concentration has been stable or decreasing in Europe for these same industries, and, perhaps most importantly, the investment rate has been slightly higher than in the US despite lower margins and stock prices.

Among these various measures, our paper is the first to compute firm-level average mark-ups accounting for the cost of debt and equity. This extends the work of Caballero et al. (2017a), who compute average mark-ups at the aggregate level.[5] The full details are provided in Appendix A, but we essentially solve for the mark-up (μ_{ij}) of firm i in industry j, in equation:

$$APK^e_{ik} = r^k_j + \frac{Y_{ik}}{\zeta_j K_{ik}}\left(1 - \frac{1}{\mu_{ij}}\right) - (1-\delta_{ij})g^e_{\zeta,ij}$$

where APK^e_i denotes the expected average product of capital for firm i; r^k_j denotes the risk-adjusted cost of capital, accounting for region x industry estimates of the equity premia based on analyst reports; $\frac{Y_i}{\zeta K_i}$ denotes the ratio of output to current-cost capital and $(1-\delta_j)g^e_{\zeta,j}$ the gains/losses from changes in the relative price of capital. Controlling for the cost of debt and equity, we find a 3.4 percentage point increase in average mark-ups relative to sales in the US (or 6.8 points relative to value added, assuming an intermediate input rate of 0.5 as in Basu (2019)). In Europe, average mark-ups increased by only 0.9 points.

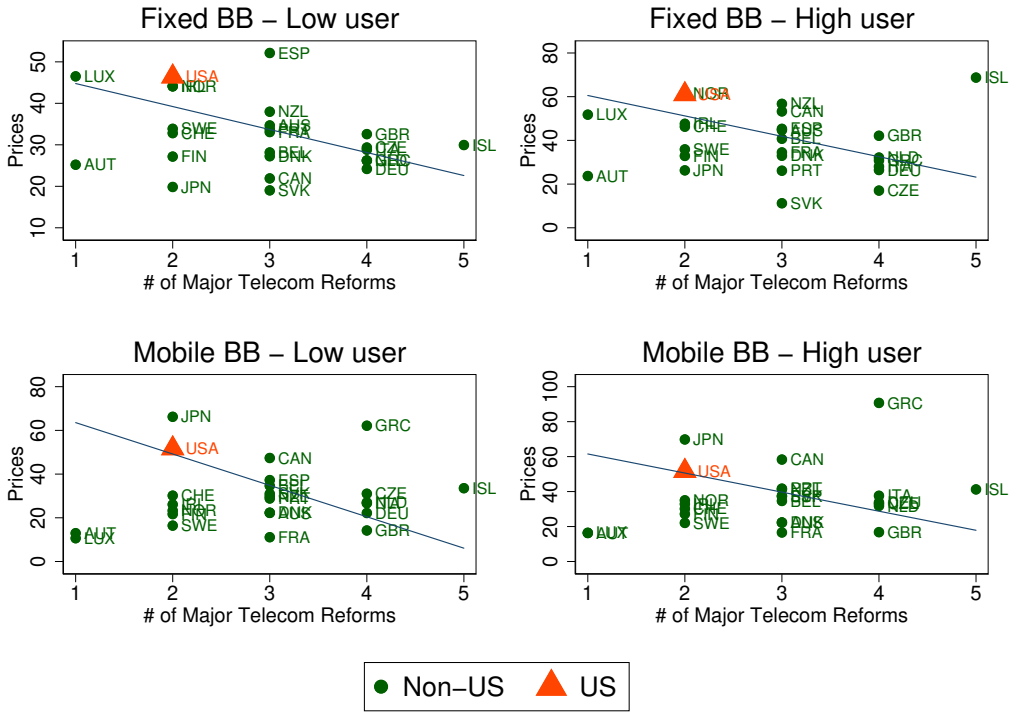
1.1 Telecoms and Airlines

The most novel feature of our empirical analysis is to study prices. Prices are absent from most firm-level datasets and hence have not been used in recent work. Let us start with two specific industries. The Telecom industry used to be relatively competitive in the US. Economides 2002 explained that (20 years ago) "one of the key reasons for Europe's lag in internet adoption is the fact [that] in most countries, unlike the United States, consumers are charged per minute for local calls. The increasing use of broadband connections is changing the model toward fixed monthly fees in Europe." Today, however, broadband prices are much cheaper in Europe than in the US. In 2018, the average monthly cost of fixed broadband was about 100% more expensive in the US ($68) than in Europe (between $30 and $40 in France, Germany, the UK, etc.).[6] Figure 4 confirms this fact using the OECD's broadband price indices, and shows that prices are lower in countries that implemented product market reforms in the Telecom sector, which is consistent with the results in Faccio and Zingales (2017).

[5] Our measure of average mark-ups also relates to the profit share of Barkai (2017). Initial results for the US were reported in the appendix of Gutiérrez and Philippon (2017a), and used by Baqaee and Farhi (2018). A similar measure is now used by De-Loecker et al. (2019) to validate a rise in market power in the US.

[6] Source: Cable.Co.UK. South Korea and Japan were similar to Europe. The authors of the report are puzzled by US prices and conclude that "while broadband in the United States is widely available and uptake is high, lack of competition in the marketplace means Americans pay far more than they should, compared to much of the rest of the world." Faccio and Zingales (2017) estimate that US consumers would gain $65bn a year if US mobile service prices were in line with German ones.

Figure 4: *Telecom Prices vs. Reforms*



Notes: OECD fixed and mobile broadband price indices for 2017, available at link. Number of major Telecom reforms from Duval et al. (2018). Similar results adjusting for PPP. Fitted line weighted by country GDP.

Air Transportation is another industry where the US used to be a clear leader in terms of competition. Figure 5 shows that both concentration and profits increased in the US, while they remained stable or decreased in Europe. The rise in US concentration and profits aligns closely with a controversial merger wave that includes Delta-Northwest (2008, noted by the vertical line), United-Continental (2010), Southwest-AirTran (2011) and American-US Airways (2014). On the other hand, the decrease in profits in Europe came from the removal of barriers to entry and the expansion of low cost airlines.[7]

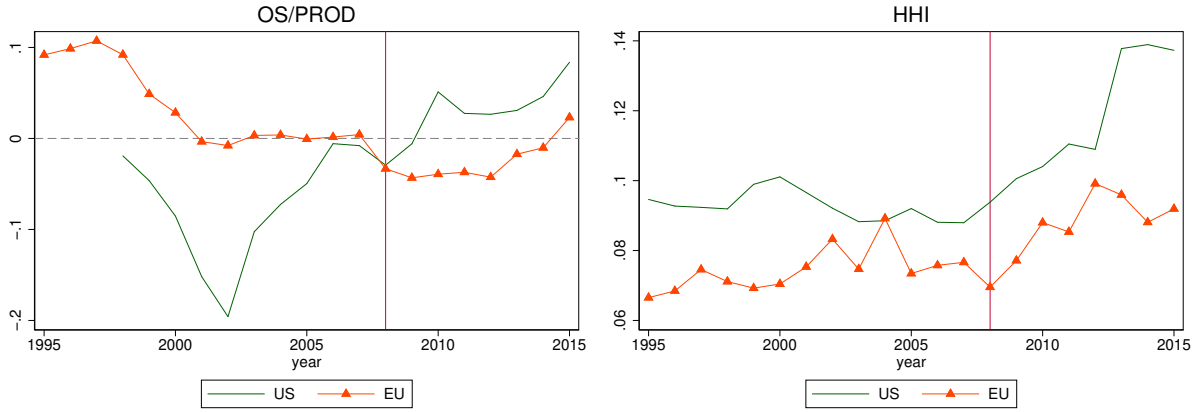
1.2 Broad Price Indexes

We now generalize our results. Our primary data sources are the International Comparison Program (ICP) and EU KLEMS 2017.[8] We use the aggregate PPP series, as well as select product categories that can be

[7] See The Economist's article, "A lack of competition explains the flaws in American aviation" (April 2017) for related observations. Low cost airlines have all but disappeared in the US even as they have expanded in Europe. Deep discounters account for roughly one-third of the market in Europe, but less than ten percent in the US. See Combes (2012).

[8] ICP is "a worldwide statistical initiative led by the World Bank ... [that aims] to provide comparable price and volume measures of GDP and its expenditure aggregates among countries within and across regions." It collects price and expenditure data for thousands of detailed products (e.g., bread) at point of sale, and aggregates them to construct purchasing power parities (PPPs).

Figure 5: *Air Transportation Profits and Concentration, EU vs US*



Notes: Chart compares the evolution of net profit rates and concentration in the Transportation - Air industry (ISIC code 51) for the US and Europe. Profit rates from OECD STAN. Concentration based on Compustat, adjusted for database coverage using OECD STAN (i.e., sale shares are defined as the ratio of firm sales to the maximum of Compustat sales and gross output from OECD STAN). EU firms included only if data for the corresponding country are available in STAN.

directly mapped to industries. Let $P_{i,c,t}$, $W_{i,c,t}$ denote the nominal price and wage, in domestic currencies, for industry i in country c at time t. We will study the evolution of prices in the EU relative to the US, controlling for wages and productivity:

$$\log\left(P_{i,c,t}\right) = \beta_1 CR4_{i,c,t-4} + \beta_2 \log\left(W_{i,c,t-1}\right) + \beta_3 \log\left(TFP_{i,c,t-1}\right) + \alpha_t + \gamma_c$$

Alternatively, we can define the cumulative change in markups on product i in country c as

$$\Delta M_{i,c,t} \equiv \Delta \log(P_{i,c,t}) - \Delta \log(ULC_{i,c,t}),$$

where $\Delta \log(P_{i,c,t})$ and $\Delta \log(ULC_{i,c,t})$ denote the cumulative change in prices and unit labor costs from a baseline year (2000): $\Delta \log(P_{i,c,t}) \equiv \log(P_{i,c,t}) - \log(P_{i,c,0})$, and $\Delta \log(ULC_{i,c,t}) \equiv (\log(W_{i,c,t}) - \log(W_{i,c,0})) - (\log(LP_{i,c,t}) - \log(LP_{i,c,0}))$.[9] We can then define the change in mark-ups relative to the US as

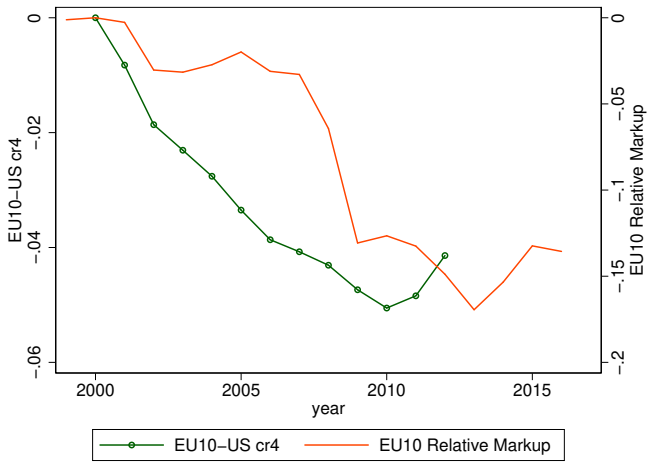
$$\Delta \hat{M}_{i,c,t} = \Delta M_{i,c,t} - \Delta M_{i,US,t}$$

We study cumulative changes in mark-ups relative to cumulative changes in concentration: $\Delta \hat{CR4}_{i,c,t} = (CR4_{i,c,t} - CR4_{i,c,2000}) - (CR4_{i,US,t} - CR4_{i,US,2000})$. At the country level we use the production-weighted average concentration ratios.

Country-level prices are available since the 1960s for a wide range of countries, but we restrict the analysis to the post-1999 period where we have country-level concentration data. Figure 6 shows the GDP-weighted average relative mark-up $\Delta \hat{M}_{i,c,t}$ and concentration $\Delta \hat{CR4}_{i,c,t}$ across EU countries. The decline

[9] When using PPP data, we only have relative prices, so the change in prices is computed directly: $\Delta \log\left(\frac{P^{\text{euro}}_{i,c,t}}{P^{\$}_{i,US,t}}\right) = \log\left(\frac{P^{\text{euro}}_{i,c,t}}{P^{\$}_{i,US,t}}\right) - \log\left(\frac{P^{\text{euro}}_{i,c,0}}{P^{\$}_{i,US,0}}\right)$.

Figure 6: *Relative Concentration and Mark-ups: EU vs US*



Notes: Annual data. Relative mark-ups and concentration estimated separately for each country, and aggregated using a GDP-weighted average. Concentration based on Compustat for the US and ORBIS for Europe. Mark-ups based on country-level PPP indices and wages. See text for details.

Table 1: *Mapping of ICP to ISIC segments*

ICP Category	KLEMS industry	Code
Food and non-alcoholic beverages	Food products, beverages and tobacco	D10T12
Clothing and footwear	Textiles, wearing apparel, leather and related products	D13T15
Communication	Telecommunications	D61
Recreation and culture	Arts, entertainment and recreation	D90T93
Education	Education	D85
Restaurants and hotels	Accommodation and food service activities	D55T56
Construction	Construction	D41T43

in relative mark-ups followed the decline in relative concentration.

At a more granular level, we consider individual products published in benchmark ICP surveys every three years since 1999. Unfortunately, the product accounts do not map one-to-one into ISIC industries. Based on a detailed comparison of ICP product categories and ISIC Industry descriptions, we were able to identify 7 product categories that map into individual industries, as shown in Table 1.[10] This is a limited sample but it gives us a different source of identification compared to the panel of countries

Panel A of Table 2 reports regression results. We find that prices and markups are positively related to concentration across countries and across industries. We also find that the differences are driven by non-tradable industries, which is consistent with Covarrubias et al. (2019) who find that foreign competition drove concentration in tradable manufacturing.

[10]Compustat and ORBIS provide limited coverage for Education. We confirm that results are robust to excluding this industry.

Table 2: *Relative Mark-ups and Concentration: US vs EU*

This table reports regression results of relative mark-ups on relative concentration, controlling for wages and productivity growth. Panel A based on ICP data. Columns 1 to 3 based on country-level PPPs and wages from the OECD. Columns 4 to 8 based on 7 product-level prices from ICP publications, along with wages and productivity growth from EU KLEMS 2017. Panel B based on producer price indices, wages and productivity from EU KLEMS 2017. All measures of concentration based on Compustat for the US and BvD ORBIS for the EU. Standard errors in brackets, clustered at the country (Panel A, cols 1-3) and country-industry level (rest). Observations weighted by GDP in country-level regressions and value added in country x industry regressions. We do not weigh observations in country x product regressions given the limited sample of products, but confirm regressions are robust to doing so. + p<0.10, * p<0.05, ** p<.01.

Panel A: ICP prices, Country and Country x Product

	$\log PPP_{c,t}$	$\Delta \log \hat{M}_{c,t}$		$\log PPP_{c,i,t}$		$\Delta \log \hat{M}_{c,i,t}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\log CR4_{t-4}$	0.18*			0.07*	0.13**			
	(0.06)			(0.03)	(0.04)			
$\Delta \log C\hat{R}4_{t-4}$		0.35*	0.30*			0.16*	0.15	0.30+
		(0.12)	(0.12)			(0.06)	(0.10)	(0.17)
$\log CR4_{t-4} \times$ tradeable					-0.09**			
					(0.03)			
$\Delta \log C\hat{R}4_{t-4} \times$ tradeable								-0.25
								(0.17)
$\log W_t$	0.76**			0.25**	0.38**			
	(0.21)			(0.08)	(0.09)			
$\log TFP_t$				-0.16	-0.18			
				(0.14)	(0.14)			
Ctry FE	Y	N	Y	Y	Y	N	N	N
Year FE	Y	N	Y	N	N	N	Y	Y
Ind x Year FE	N	N	N	Y	Y	N	N	N
Ctry x Ind FE	N	N	N	N	N	N	Y	Y
R2	1	.53	.9	.95	.96	.041	.69	.71
Observations	117	117	117	224	224	120	120	120

Panel B: KLEMS prices, Country x Industry

	$\log P_{i,c,t}$	$\Delta \log \hat{M}_{c,i,t}$		
	(1)	(2)	(3)	(4)
$\log CR4_{t-4}$	0.01**			
	(0.00)			
$\Delta \log \hat{CR4}_{t-4}$		0.08**	0.06**	0.10**
		(0.02)	(0.02)	(0.03)
$\Delta \log \hat{CR4}_{t-4} \times$ tradeable				-0.07+
				(0.04)
$\log W_t$	0.07*			
	(0.03)			
$\log TFP_t$	-0.44**			
	(0.05)			
Ind x Year FE	Y	N	N	N
Ctry FE	Y	N	N	N
Ctry x Ind FE	N	Y	Y	Y
Year FE	N	N	Y	Y
R2	.73	.85	.87	.87
Observations	2,219	1,788	1,788	1,788

Panel B of Table 2 uses prices from KLEMS to validate our results across all industries. Unlike ICP data, these are not actual prices at point of sale.[11] But the broader dataset allows us to study the joint evolution of prices, wages and productivity in the entire economy.[12] The results are reassuringly similar to the ones in Panel A.

Over the past 20 years, prices, markups and concentration have increased significantly more in the US that in the EU. Many goods and services that used to be cheaper in the US are now cheaper in Europe. Productivity growth does not explain these differences across products, industries, or countries.[13] As we have explained in the introduction, these evolutions are deeply surprising. In the next section, we propose a model to explain them.

2 Model

We present a model of the design of EU institutions. There are two goods, two periods, and either one or two countries. In the first period a policy maker designs the regulator. In the second period, the regulator protects consumer welfare subject to lobbying pressures. We interpret the first period as the 1980's and 1990's, when

[11] EU KLEMS reports value added and deflators at "basic prices." These include factors costs and "other taxes, less subsidies, on production." To obtain value added at market prices, one must further add "taxes less subsidies, on products", "taxes, less subsidies, on imports", "Trade and transport costs" and "Non-deductible VAT".

[12] We exclude four outlier industries: Mining and Mfg - Petroleum given the impact of the Fracking boom, and Mfg - Textiles and Electrical due to severe import competition.

[13] GDP growth is higher in the US than in Europe because of demographic differences. The cumulative growth rate of GDP per capita has been about 70% between 1999 and 2017 in both regions.

EU institutions are designed, and the second period as the 2000's when we observe the evolution of Europe relative to the US. We solve the model by backward induction, first with one country, then with two.

Table 3: *Timing and Preferences of the Model*

	First Period (1990's)	Second Period (2000's)
Policy Maker	$W = \mathbb{E}\left[(1-\beta)U + \beta V_\epsilon\right]$	.
Politician	.	$V_\epsilon = U + \gamma\Pi_\epsilon$, $\epsilon \in (1,2)$
Regulator	θ is set	$\mathcal{R} = \max(1-\theta)U + \theta V_\epsilon$

2.1 One country

We start in the second period, when the regulator is in place.

Technology and Preferences The economy produces and consumes two goods indexed by $i \in \{1,2\}$. Let x denote consumption and n denote labor. Households' preferences are given by $U \equiv \sum_{i=1}^{2} u(x_i) - n$, where we assume that u is strictly increasing and strictly concave. For simplicity, we consider the case of log-preferences: $u \equiv \log$ and linear technologies. The general case (decreasing returns or generic concave utility) is presented in the Appendix. The technology has constant returns and uses only labor with productivity z: $x_i = z_i n_i$. We discuss decreasing returns in the extensions. Labor market clearing requires $n = \sum_{i=1}^{2} n_i$. Given prices and wages, households maximize

$$U = \max \sum_{i=1}^{2} \log(x_i) - n$$
$$s.t. \sum_{i=1}^{2} p_i x_i = wn + \sum_{i=1}^{2} \Pi_i^{\$}$$

where $\Pi_i^{\$}$ are (nominal) profits from industry i. Let λ be the Lagrange multiplier on the budget constraint. We have $u'(x_i) = \lambda p_i$ and $1 = \lambda w$ which, with log-preferences, implies the demand curve

$$x_i = \frac{w}{p_i}. \tag{1}$$

Regulated Monopolies Let us now consider the market equilibrium under regulation. Firms' profits are given by $\Pi_i = p_i x_i - w\frac{x_i}{z_i}$. The regulator sets an upper bound μ_i on the markup that firms can charge. In equilibrium firms choose the maximum allowable price

$$p_i = \frac{1+\mu_i}{z_i} w \tag{2}$$

Using equations (1) and (2), we then get the equilibrium output

$$x_i = \frac{z_i}{1+\mu_i}$$

There is a direct mapping between the markup and the quantity produced in equilibrium. We can therefore think of the regulator as indirectly choosing the quantities $\{x_i\}_{i=1,2}$. This leads to the indirect utility function for the households

$$U\left(\{x_i\}_i\right) = \sum_{i=1}^{2} \log\left(x_i\right) - \frac{x_i}{z_i}.$$

Nominal profits can be written as a function of markups or quantities $\Pi_i^{\$} = w\mu_i \frac{x_i}{z_i} = w\frac{\mu_i}{1+\mu_i} = w\left(1 - \frac{x_i}{z_i}\right)$. We define real profits as $\Pi_i = \Pi_i^{\$}/w$ and therefore

$$\Pi_i = 1 - \frac{x_i}{z_i}$$

Note that $\frac{\partial \pi}{\partial x_i} < 0$ and that the consumer welfare maximizing level is $x_i^* = z_i$, which corresponds to $\mu_i = 0$ and $\Pi_i = 0$. The first best utility level is

$$U^* = \sum_{i=1}^{2} \log\left(z_i\right) - 2.$$

Welfare and Capture Ex-Post Firms seek to influence politicians and regulators in order to increase their market power. As in the political support literature, we assume that politicians' utility is a mixture of social welfare and corporate profits, and we consider random regulatory capture by one of the two industries:

$$V\left(\epsilon\right) = U + \gamma \Pi_\epsilon,$$

where $\epsilon = 1, 2$ with equal probability. Our specification of the utility function is similar to the one in Grossman and Helpman (1994). The main difference is that we assume that regulations are enforced by regulators, and only indirectly influenced by politicians, to the extent that regulators are not fully independent. Regulators maximize a weighted average of consumers welfare U and politicians' utility V

$$\mathcal{R} = \max_{\{\mu_i\}} \left(1-\theta\right) U + \theta V\left(\epsilon\right) \tag{3}$$

The parameter θ captures the degree of influence of politicians over regulators. The point of our model is to understand the forces that determine θ and how they change when we consider a supra-national regulator. For simplicity, but with a slight abuse of notations, we write $x_{i=\epsilon} \equiv x_i\left(\epsilon = i\right)$ and $x_{i\neq\epsilon} \equiv x_i\left(\epsilon \neq i\right)$. We measure the deviation from ex-post consumer surplus maximization by the variable m defined as the ratio of output to efficient output:

$$m_i \equiv \frac{x_i}{x_i^*},$$

and recall that with constant returns and log-preferences we simply have $x_i^* = z_i$. We will use $\bar{m}$ to denote the equilibrium with one country and m^s to denote the equilibrium with a supra-national regulator. We have the following Lemma.

Lemma 1. *In the one country model with random capture, one industry is competitive ($x_{i\neq\epsilon} = z_i$ and $\Pi_{i\neq\epsilon} = 0$) while the other industry charges a markup $\gamma\theta$: $x_{i=\epsilon} = \bar{m}z_i$ and $\Pi_{i=\epsilon} = 1-\bar{m}$ where $\bar{m} \equiv \frac{1}{1+\gamma\theta}$. The ex-post utility of the representative household is*

$$U(\theta) = U^* + \log(\bar{m}) + 1 - \bar{m}.$$

Proof. The program of the regulator is equivalent to

$$\max_{\{x_i\}} U(\{x_i\}_i) + \theta\gamma\Pi_\epsilon$$

We can write the objective function as

$$\sum_{i=1}^{2} \log(x_i) - \frac{x_i}{z_i} + 1_{i=\epsilon}\theta\gamma\left(1 - \frac{x_i}{z_i}\right)$$

The solution is $x_{i\neq\epsilon} = z_i$ and $x_{i=\epsilon} = \frac{z_i}{1+\gamma\theta}$, so $\bar{m} = \frac{1}{1+\gamma\theta}$. □

Ex-Ante Design of Regulatory Independence The first period corresponds to the design of institutions. To be concrete, in the case of Europe, we think of politicians and civil servants setting up the framework for EU competition policy in the 1990's. The utility of the politicians building the regulatory framework is

$$W = \mathbb{E}\left[(1-\beta)U + \beta V_\epsilon\right]$$

The founding fathers choose θ to maximize W.

Lemma 2. *In a closed economy (one country), the politicians choose a regulatory framework with influence parameter*

$$\theta = \beta$$

There are several ways to interpret the parameter β. In the equations above, β captures the bias in the preferences of the politicians designing the institutions. In our simplified setup a benevolent planner would create fully independent institutions charged simply with maximizing consumer surplus. In reality, there might be legitimate reasons to deviate from strict consumer surplus maximization ex-post: externalities, entry costs, innovations, etc. In Lim and Yurukoglu (2018), for instance, there is an optimal ex-post return on capital that encourages efficient investment ex-ante. The appendix presents a simple model where a benevolent planner chooses θ, taking into account externalities.[14]

[14] A good example is that of technological clusters. One can view them as places where innovative individual and businesses can come together and shares ideas. Clusters generate plausible externalities that can justify political interventions. On the other hand, they are "absolute catnip for policy makers and pundits" as Haskel and Westlake (2017) argue. All we need for the benevolent interpretation of our model is that there is a legitimate case of externality, yet politicians cannot be fully trusted.

Perhaps more importantly, there are significant ideological differences among politicians. Lim and Yurukoglu (2018) find that "conservative regulators [within the US] mitigate welfare losses due to time inconsistency, but worsen losses from moral hazard." There are also persistent differences across countries. In France, there is a long tradition of "Colbertisme", which argues for state intervention in the economy and for industrial policy aimed at protecting firms from excessive competition. Historically, the UK, and later the US, have championed a more free-market approach, and have been suspicious of politicians exerting direct influence on business decisions. These stereotypes are somewhat simplistic but they capture material differences in how countries operate. We can thus also think of France or Italy as being high β countries for ideological reasons. Throughout our discussion, we think of the institutional design of θ as encompassing all competition policy, from entry and product market regulation, to antitrust, to judicial review.

2.2 Supra-National Regulatory Design

We extend our model to two countries and we assume that production is specialized. Country j produces good j. We assume that the law of one price holds, so that the price of good i is the same in both countries. Let $x_{i,j}$ denote the consumption of good i by country j. Consumer welfare in country j is given by

$$U_j = \sum_{i=1}^{2} \log\left(x_{i,j}\right) - n_j.$$

The demand for goods is similar to equation (1) except that wages might differ across countries: $x_{i,j} = \frac{w_j}{p_i}$. Balanced trade requires

$$p_1 x_{1,2} = p_2 x_{2,1}$$

This implies $w_1 = w_2$.[15] Given that wages and prices are equalized, so are the quantities consumed for each good: $x_{i,i} = x_{i,j} \equiv x_i$. Since $p_i = (1+\mu_i)\, w_i / z_i$, we still have $x_i = \frac{z_i}{1+\mu_i}$. Market clearing requires $z_i n_i = x_{i,i} + x_{i,j} = 2x_i$, so in equilibrium, we have

$$U_i = \log\left(x_i\right) + \log\left(x_j\right) - \frac{2x_i}{z_i} \tag{4}$$

and profits are

$$\Pi_i = 2\left(1 - \frac{x_i}{z_i}\right)$$

Ex-Post Regulatory Capture Politicians care about domestic welfare and the profits from domestic industries: $V_i = U_i + \gamma \Pi_i$. Politicians from each country attempt to influence the common regulator and are equally likely to succeed. Let ϵ denote the winning country. The supra-national regulator then maximizes

[15] This is the simplification brought by assuming log preferences. When the demand elasticity is not one, then the relative wage will in general differ from one. This does not change our main results but it complicates the exposition.

$(1-\theta)(U_1+U_2)+\theta V_\epsilon$, which we can also write as

$$\mathcal{R}^s = \max U_{i=\epsilon} + (1-\theta) U_{i\neq\epsilon} + \theta\gamma\Pi_{i=\epsilon}.$$

Using (4), the objective function becomes $(2-\theta)\log(x_{i=\epsilon})+(2-\theta)\log(x_{i\neq\epsilon})-(1+\theta\gamma)\frac{2x_{i=\epsilon}}{z_{i=\epsilon}}-(1-\theta)\frac{2x_{i\neq\epsilon}}{z_{i\neq\epsilon}}+2\theta\gamma$. Let "$s$" to denote the equilibrium with a supra-national regulator. The solution is

$$\frac{x_{\epsilon=i}}{z_i} = m^s(\theta;\gamma) \equiv \frac{1-\frac{\theta}{2}}{1+\theta\gamma} < \bar{m},$$
$$\frac{x_{\epsilon\neq i}}{z_i} = M^s(\theta;\gamma) \equiv \frac{1-\frac{\theta}{2}}{1-\theta} > 1.$$

The allocation is distorted in two ways compared to the one country model. First, politicians perceive a different trade-off between profits and welfare because higher prices fall partly on foreign households. This explains why $m^s < \bar{m}$. Second, they seek to impose lower markups to foreign producers in order to benefit domestic households.[16] This explains why $M^s > 1$. The risk of "regulatory overreach", as emphasized by the Chicago school, is then higher than in the one country case. Ex-post utilities are

$$U_{i=\epsilon} = U^* + \log(m^s) + \log(M^s) + 2(1-m^s)$$
$$U_{i\neq\epsilon} = U^* + \log(m^s) + \log(M^s) + 2(1-M^s)$$

Ex-Ante Design Let us consider the choice of θ. The expected utility of policy makers from country i under supra-national supervision is

$$\begin{aligned} W^s(\theta) = \mathbb{E}\left[(1-\beta)U_i + \beta V_i\right] &= \mathbb{E}\left[U_i + \beta\gamma\Pi_i\right] \\ &= U^* + \log(m^s) + \log(M^s) + (1+\beta\gamma)(2-m^s-M^s) \end{aligned}$$

This new program differs from the one country program in two ways. First, $m^s(\theta)$ implies a different mapping than $\bar{m}(\theta)$. This means that, even if we ignored M^s, implementing the preferred markup $\gamma\beta$ would require a lower value of θ.[17] Second, increasing θ lowers m^s but it increases M^s. This implies more independence and lower average markups. The following proposition summarizes our results.

Proposition 1. *Politicians choose a higher degree of independence for a supra-national regulator than for a national one:*

$$\theta^s \in (0,\beta).$$

Since $M'(\theta) > 0$, the equilibrium also implies more competitive markets: $m^s(\theta^s) > \bar{m}(\beta)$.

Proof. M is a strictly increasing function of θ while m is decreasing in θ. The objective function is

$$W^s(\theta) - U^* = \log(m) + \log(M) + (1+\beta\gamma)(2-m-M)$$

[16] With linear technologies this implies negative operating profits. It is easy to extend the model to include decreasing returns and fixed entry costs. In that case operating profits would be still positive, as shown in the Appendix.

[17] To achieve a markup of $\gamma\beta$, i.e., to get the quantity $m = \frac{1}{1+\beta\gamma}$, the designer would need to set $\theta = \frac{\beta\gamma}{\gamma+\frac{1+\beta\gamma}{2}}$.

The derivative is

$$\begin{aligned}\frac{\partial W^s}{\partial \theta} &= \frac{m'}{m} + \frac{M'}{M} - (1+\beta\gamma)\left(m' + M'\right) \\ &= -m'\left(1 + \beta\gamma + \left(1 + \beta\gamma - \frac{1}{M}\right)\frac{M'}{m'} - \frac{1}{m}\right)\end{aligned}$$

Therefore the solution is

$$\frac{1}{m} = 1 + \beta\gamma + \frac{M'}{m'}\left(1 + \beta\gamma - \frac{1}{M}\right)$$

Since $M > 1$ and $m' < 0$ we have $\frac{M'}{m'}\left(1 + \beta\gamma - \frac{1}{M}\right) < 0$ and therefore m is larger than $(1+\beta\gamma)^{-1}$. This proves $m^s(\theta^s) > \bar{m}(\beta)$ if and only if $M' > 0$. Since $m^s < \bar{m}$ for all θ, this also proves $\theta^s < \beta$. Next we need to show that $\theta^s > 0$. When $\theta = 0$ and $m = M = 1$, we have $\frac{\partial M}{\partial \theta} = \frac{1}{2}$; $\frac{\partial m}{\partial \theta} = -\frac{1}{2} - \gamma$ therefore

$$\frac{M'}{m'}(0) = -\frac{1}{1+2\gamma}$$

Thus

$$1 + \beta\gamma + \beta\gamma\frac{M'}{m'}(0) = 1 + \beta\gamma\frac{\gamma}{\gamma + 1/2} > 1$$

and therefore

$$\frac{\partial W}{\partial \theta}(0) > 0$$

Starting from $\theta = 0$, a marginal increase in markups raises the ex-ante value function of politicians. This proves $\theta^s > 0$. QED. □

Proposition 1 contains the first prediction of our theory: there should be a clear difference between the design of national and supra-national regulators. The supra-national regulator should not reflect the average of countries' preferences, but instead, we should observe a discrete increase in independence and a stricter enforcement of competition. The key insight comes from comparing the consequences of potential regulatory capture. The capture of a joint regulator leads to larger welfare losses because national politicians do not care about the citizens of other countries. As a result, it is efficient to commit ex-ante to a more independent regulator. This, in our view, explains why DG Comp is structurally more insulated from political and lobbying pressures than national regulators used to be.[18]

The Appendix presents an analysis of the model with more general functional forms. With linear disutility of labor and linear technology, agents are de-facto risk neutral because they can fully smooth consumption by adjusting labor supply. The Appendix derives the solution under decreasing returns. In that case, there is an additional argument for independence of the supra-national regulator, because politicians are more worried about the regulator being captured by the other country than they are attracted by the opportunity to capture the regulator themselves. In other words, capture is risky, and independence reduces risk.

[18] Interestingly, this does not imply a complete lack of democratic accountability as evidenced by the evolution of DG Comp from an entirely independent organization to an increasingly democratic one following the 2004 reforms (First and Weber Waller, 2013).

2.3 Extensions

We now extend the basic model to obtain other predictions regarding lobbying and ex-ante heterogeneity across countries. It is straightforward to extend our analysis to the case of N countries. We show in the Appendix that regulatory independence increases with N and converges to a finite value as N becomes large.

Heterogeneous Countries Some of our empirical tests relate to ex-ante heterogeneity among countries. For instance, we show that EU countries with weaker ex-ante institutions benefit more from supra-national regulation. Consider two countries such that $\beta_1 < \beta_2$. Before integration, country 2 has more biased politicians, more captured regulators, and weaker competition. We know that

$$W_i^s(\theta) - U^* = \log(m^s(\theta)) + \log(M^s(\theta)) + (1+\beta_i\gamma)(2 - m^s(\theta) - M^s(\theta))$$

Assuming equal bargaining power at the design stage we solve

$$\max_{\theta} \sum_{i=1}^{2} W_i^s(\theta)$$

The first order condition is

$$\frac{m'}{m} + \frac{M'}{M} - \left(1 + \frac{\beta_1+\beta_2}{2}\gamma\right)(m' + M')$$

We then have the following straightforward proposition.

Proposition 2. *Countries with weaker ex-ante institutions benefit more from supra-national regulation.*

Countries with low initial β benefit less, but because the average β goes down, they still benefit as long as the distribution of β's is not too wide. Also notice that we have followed a weighted average approach at the design stage. In reality the EU Commission explicitly promotes best practice and we can expect low β countries to have more sway.

Lobbying Introducing lobbying explicitly allows us to make another testable prediction. Suppose firms spend l real resources on lobbying – they hire l lobbyists for instance.[19] We assume that the influence of lobbyists is measured by the function $\Gamma(l;\theta)$, increasing in both arguments and super modular. Equation (3) then becomes

$$\mathcal{R} = \max_{\{x\}} U(x) + \Gamma(l;\theta)\,\Pi$$

We know that this leads to $m \equiv \frac{1}{1+\Gamma}$ and $\Pi = \frac{\Gamma}{1+\Gamma}w$. For simplicity we consider here the one-country model, but it is straightforward to derive similar results with many countries. Firms maximize profits net of lobbying expenses $\Pi_i^{\$} = p_i x_i - w\frac{x_i}{z_i} - wl$. This is equivalent to

[19] Official lobbying and corruption are clearly different, both legally and empirically, but that distinction does not really matter in our model. One can think of l as the number of lawyers and consultants hired, as campaign contributions, or as bribes. In our empirical analysis, however, we will measure "legal" lobbying.

$$\max_{\{l\}} \frac{\Gamma(l;\theta)}{1+\Gamma(l;\theta)} - l$$

From the super-modularity of $\Gamma(l;\theta)$, it is clear that the solution $l(\theta)$ is an increasing function. We then have the following proposition.

Proposition 3. *In countries with more independent regulators, lobbyists are less successful and firms spend less on lobbying.*

An example of a simple functional form is $\Gamma(l;\theta) = \frac{\sqrt{\gamma l\theta}}{1-\sqrt{\gamma l\theta}}$. In that case $\frac{\Gamma(l;\theta)}{1+\Gamma(l;\theta)} = \sqrt{\gamma l\theta}$ and therefore $l(\theta) = \frac{\gamma\theta}{4}$ and, in equilibrium, $\Gamma(\theta) = \frac{\gamma\theta}{2-\gamma\theta}$, which is a simple renormalization of the formula that we have used so far. We will discuss in Section 5 how shocks to lobbying can also help us understand the divergence between the US and Europe.

Endogenous Common Market So far we have taken as given the existence of a common regulator. But would politicians actually choose to set up a common regulator, or would they prefer to retain their national sovereignty? The design of the regulator took place in the context of the single market so let us consider what the equilibrium would be under free trade but without joint supervision. The regulator in country i would solve

$$\max_{x_i} U_i + \theta_i\gamma\Pi_i = \log(x_i) + \log(x_{-i}) - 2\frac{x_i}{z_i} + 2\theta_i\gamma\left(1 - \frac{x_i}{z_i}\right)$$

which leads to $x_i = \frac{1}{2}\frac{z_i}{1+\theta_i\gamma}$ and profits $\Pi_i = 2\left(1 - \frac{x_i}{z_i}\right)$. Note that even without direct influence ($\gamma = 0$), the allocation is distorted because the country acts as a monopolist. The ex-ante value for the politicians is $W_i = U_i + \gamma\beta_i\Pi_i$. They would choose $\theta_i = \beta_i$ as in the one country case. This would implement $x_i = \frac{1}{2}\frac{z_i}{1+\theta_i\gamma}$ and deliver ex-ante utility

$$W_i = U^* + 1 - 2\log 2 - \log(1+\beta_i\gamma) - \log(1+\beta_j\gamma) + 2\beta_i\gamma.$$

Recall that with supra-national regulation we have $W^s = U^* + \log(m_\theta^s) + \log(M_\theta^s) + (1+\beta_i\gamma)(2 - m_\theta^s - M_\theta^s)$, for the optimally chosen $\theta = \theta^s$ and the implied $m^s(\theta^s;\gamma)$ and $M^s(\theta^s;\gamma)$. We can show the following proposition

Proposition 4. *There exists an upper bound $\bar{\beta}$ on political bias such that, if $\beta < \bar{\beta}$, politicians of the two countries agree to set up a common regulator as described in Proposition 1.*

Proof. Politicians prefer a supra-national regulator as long as $W^s > W_i$. We have

$$\begin{aligned} W^s - W_i = {} & 2\log 2 - 1 + \log(m_\theta^s) + \log(M_\theta^s) \\ & + (1+\beta_i\gamma)(2 - m_\theta^s - M_\theta^s) + \log(1+\beta_i\gamma) + \log(1+\beta_{-i}\gamma) - 2\beta_i\gamma \end{aligned}$$

When $\beta_i = \beta_{-i} = 0$, we have $m = M = 1$ and $W^s - W_i = 2\log 2 - 1 > 0$. By continuity this extends to values of β that are strictly positive. On the other hand, if $\beta\gamma$ is large, we can have $W^s - W_i < 0$. □

2.4 Summary of Model Predictions

The model yields three key predictions

1. **Proposition 1:** EU countries agree to set up a competition regulator that is tougher and more independent than their old national regulators (and potentially the US).

2. **Proposition 2:** Countries with weaker ex-ante institutions benefit more from delegation to supra-national institutions.

3. **Proposition 3:** US firms spend more on lobbying US politicians and regulators than EU firms

We test these predictions in the rest of the paper. The data appendix describes our data, compiled from a variety of sources. We focus on two important determinants of competition: antitrust and product market regulation. Both of these were developed with, and played a critical role in the creation of the Single Market. In fact, antitrust was established as a supra-national capability at the time of creation of the Single Market: Article 3(1)(g) of the 1957 Treaty of Rome envisioned "a system ensuring that competition in the internal market is not distorted".[20] Product market reforms came later. They started on a limited scope with the 1985 Single Market Plan, and accelerated in the 2000s with the Lisbon Strategy, which aimed *"at opening up product markets to competition in particular by completing the internal market for goods and services, by removing obstacles to competition in Member States and by creating a business environment more conducive to market entry and exit"*(Zeitz, 2009). While the Lisbon Strategy failed in some dimensions, substantial product market reforms were implemented.[21]

3 Test of Proposition 1: Tougher and more independent regulator

Proposition 1 implies that a joint regulator is more likely to be a tough regulator. Empirically, we can break down this prediction into three components. The first is the design of the antitrust regulator, i.e., the formal framework defining the potential actions of the regulator, which is called "Laws & Policy". To make this comparison, we can rely on extensive existing research. The key prediction of our theory is that we should observe a discrete difference between the EU national regulators and the EU's supra-national one. The second prediction concerns the actions of the antitrust regulator. Even if a framework is formally tough,

[20] See Appendix D.1 for a brief history of Antitrust institutions on both sides of the Atlantic. The first of US institutions were established with the The Sherman Act of 1890. The foundations of European competition policies were established much later – in the 1957 Treaty of Rome, which built on the European Coal and Steel Community (ECSC) of 1951. Council Regulation 17 made the enforcement powers effective in 1962, and the EU Commission made its first decision in 1964. This regulation was modernized by regulation 1/2003, which has been effective since May 2004.

[21] Some countries (such as the UK) pursued economic deregulation independently as early as 1979. Why did European economic integration happen so quickly in the 1980s and 1990s? The answer is far from obvious. The single market was not the by-product of some inevitable process of globalization. An astute observer in 1980 could not easily have predicted the rapid emergence of the Single Market. Jabko (2012) argues that the European Commission played to its advantage the idea of the 'market' in order to promote European integration. Jabko's demonstration relies on four detailed case studies: the integration of financial markets, the deregulation of the energy market, structural policies (such as development policies for new member states), and the European Monetary Union (EMU). In all these cases, Jabko argues that the Commission used the idea of the 'market' to promote its agenda of European integration. This idea, however, meant different things to different people. Depending on the audience, it was possible to emphasize the free-market component, the common regulation, or the protection from the economic giants of Asia and America.

this does not mean that it is tough in practice. We therefore also consider actual regulatory actions, i.e. "Enforcement." This comparison is more complicated and the data are noisier but the results are consistent. The third prediction relates to Product Market Regulation. Regulation is slightly removed, since the EU has only partial oversight over Member States' regulations – but supranational institutions still play a role. The EU can formally influence regulations in three ways: it can directly prohibit certain domestic regulations (e.g., prohibition of Golden Shares and price controls in transportation industries); it can work with member states to achieve mutual recognition of restrictions; or it can enact case law based on a treaty (e.g., ongoing regulation of State Aid by DG Comp). In other cases, the countries themselves must implement the reforms and the EU's influence takes the form of peer-pressure and disclosure.[22]

3.1 Antitrust Laws and Policies

Let us start with regulatory design. Figure 7 shows the indicators of Competition Law & Policy published by the OECD in 2013 (Alemani et al., 2013). Indicators are available for each country's National Competition Authority (NCA) as well as DG Comp. In Europe, NCAs deal with cases that have national impact. The European Commissioner for Competition and the Directorate-General for Competition (DG Comp) enforce European competition law in cooperation with the NCAs. DG Comp prepares decisions in three broad areas: antitrust, mergers, and state aid.

Consistent with the predictions of our model, DG Comp is more independent and more pro-competition than any of the national regulators. DG Comp attains the best possible score in the three categories that directly map into our model: Scope of Action, Policy on Anticompetitiveness, and Probity of Investigation.[23] Probity of Investigation measures government interference in antitrust policy. For instance, it measures whether governments can interfere with the investigations or the decisions taken on antitrust infringements and mergers. DG Comp is essentially free from interference by national governments and its score is much lower than the average score of national authorities.

Another striking feature of the data is that DG Comp scores better than American regulators. Historically, it is clear that $\theta^{US} = \beta^{US} < \beta^{EU}$, where β^{EU} would be the "average" across EU countries. On the other hand, Proposition 1 says that $\theta^{EU} < \beta^{EU}$. Our model can explain $\theta^{EU} < \theta^{US}$ as long as the costs of potential distortions in the single market are large enough.

The scores reported in Figure 7 cover OECD countries. Hylton and Deng (2006) (HD hereafter) code key features of the competition laws for 102 countries. In addition to expanding our sample, the methodology used by HD is independent from the one used by the OECD (HD published their indexes first, and

[22] During the implementation of the Lisbon Strategy, for example, the overall objectives were set jointly by the EU and Member States. From then on, Member States were in charge of implementation but were also required to submit reports to the European Commission on an on-going basis: the so-called Cardiff Reports from 200-2004, followed by National Reform Programs and implementation reports. The EU used those reports to continuously monitor and disclose progress – including the creation of the Microeconomic Reform database (MICREF) which compiled and tracked progress across all states. EU and peer pressure were seen as key 'embarrassment tools' available to encourage reform. If countries still fail to implement required reforms, the Commission may curtail the allocation of the EU Cohesion Funds. Last, for states in the process of accession, stringent reform requirements are negotiated in advance – as evidenced by the substantial reforms implemented at new EU Member States in Central and Eastern Europe.

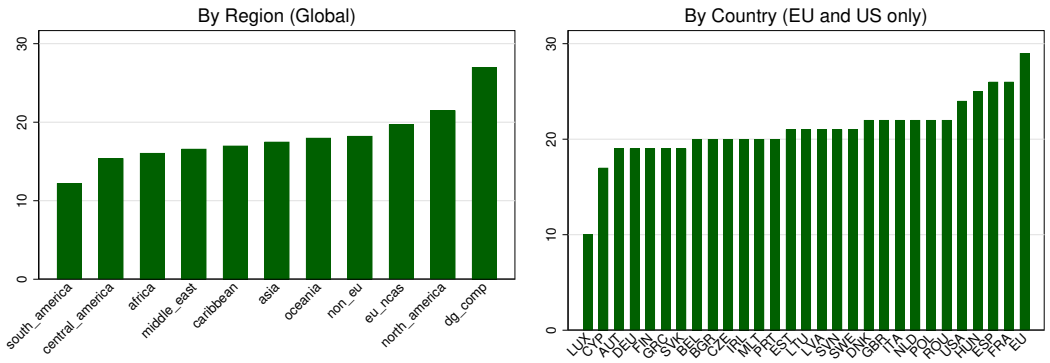
[23] The "advocacy" measure is less directly relevant: it asks whether the regulator itself can advocate for a more competitive environment. Only the UK and Denmark offer somewhat more freedom for advocacy.

Figure 7: *Restrictions on Competition Law & Policy (OECD Indicators, 2013)*



Note: higher bar means more restrictions (less pro-competition enforcement). Sample includes EU countries plus AUS, CAN, JPN, KOR, NOR, CHE and USA. Here are a few examples of each category: Are there exemptions from the competition law for public and foreign firms (*scope of action*)? Are anticompetitive behaviors and anticompetitive mergers prohibited? Have there been interventions recently against such behaviors (*policy on anticompetitiveness*)? Do governments interfere with the investigations or the decisions taken on antitrust infringements and mergers (*probity of investigation*)? Can regulators advocate for a more competitive environment, e.g., by performing market studies and delivering recommendations (*advocacy*)? Source: Alemani et al. (2013).

Figure 8: *Hylton and Deng Antitrust Indicators: Overall*



Notes: higher bar means stronger competition law. Left plot shows the average total Antitrust "scope index" by region, as reported in Hylton and Deng (2006). EU NCAs measures the average score of member state's Competition laws before integration with EU law. Right plot shows the most recent score of individual countries, as well as those of DG Comp. Individual country scores may have been updated since publication of Hylton and Deng (2006), so we gather them manually from link.

the OECD builds on previous, independent work). Figure 8 summarizes their scores. Note that HD and the OECD use opposite normalizations for their indexes: a high score in HD means more independence. The left panel shows the average score by region and the right panel shows the scores of each EU country separately, along with the score of the US and the European Commission. HD conclude that *"in terms of overall scope, the strongest regions are predictably North America and EU Europe. If the scope of EU competition law is determined on the basis of national competition statutes, EU Europe follows closely behind the North America region.* ***If, on the other hand, the scope of EU law is determined on the basis of EU Treaty law, Europe is by far the strongest region in the world.***"

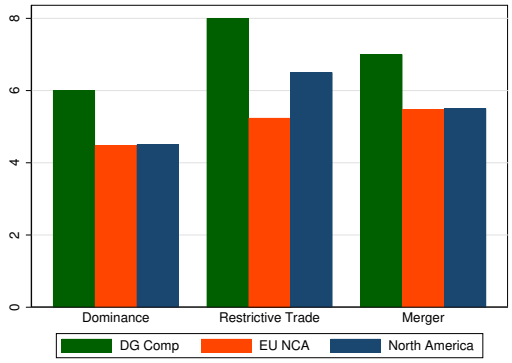
HD also separate their scores by type of economic conduct. Figure 9 shows that DG Comp is stricter across all types of conduct. To conclude, the OECD and HD scores provide a consistent picture of the regulatory landscape which is strongly supportive of the predictions of our model.[24]

3.2 Antitrust Enforcement

Do tougher policies translate into tougher enforcement? To shed light on this question we study recent trends in merger and non-merger enforcement. We emphasize at the outset that this is a difficult endeavor, for two main reasons. First, regulatory actions are an equilibrium outcome influenced by many factors, including

[24]It is worth noting that several other indicators have been proposed in the literature. We focus on the OECD and HD scores because they (i) are well regarded in the literature, (ii) are among the most recent publicly available scores, (iii) cover a broad sample of countries, and (iv) separate the EU from the member states, a critical condition for testing our model. Among the remaining scores, the most prominent are those of Voigt (2009); Buccirossi et al. (2011); Bradford and Chilton (2018). However, neither Voigt (2009) nor Buccirossi et al. (2011) provide complete scores for the EU (Buccirossi et al. (2011) score DG Comp only in a subset of dimensions and Voigt (2009) provides no scores). Bradford and Chilton (2018) do provide scores for the EU. Their methodology builds on but substantially differs from HD. Bradford and Chilton (2018) include some additional elements; exclude others they deem repetitive; and weigh different provisions differently. For instance, they place less weight on merger control and more weight on defenses. They score the EU below the US but acknowledge that *"the EU's Index may seem surprisingly low compared to other jurisdictions given the EU's reputation as the most stringent competition regime in the world.... the perception of EU competition laws as stringent may be attributed to how often the EU deploys prohibitions it has in place and actually enforces the law rather than any unusual stringency of its laws as such."* We look at enforcement next.

Figure 9: *Hylton and Deng Antitrust Indicators: By Type of Economic Conduct*



Notes: Hylton and Deng (2006) scores by type of economic conduct. EU NCA equals the average score across EU countries before integration with EU law.

expectations of market participants. We think that comparing the EU and the US allows us to control for common trends. But the second issue is that actions are not necessarily defined and measured consistently across different jurisdictions, particularly for non-merger enforcement as discussed in more detail below. The main exception is Bergman et al. (2010) who control for the specifics of each case across regions. This is an important caveat to keep in mind when making comparisons in levels of non-merger enforcement, which is why we mainly focus on trends.

Before diving into the numbers, it is useful to make two preliminary points. The first point is that European Antitrust enforcement has remained active in recent years. Carree et al. (2010) show that, on average, 264 cases of antitrust, 284 cases of merger, and 1,075 cases of State aid were investigated every year from 2000 to 2004. There is no discussion of weak Antitrust enforcement in Europe – either in Academia or the media – compared to a growing body of work in the US. In fact, EU politicians often complain about excessively stringent enforcement.

The second point is that there is no evidence that EU and US regulators are biased for or against foreign firms. Carree et al. (2010) and Bradford et al. (2017), for instance, find that DG Comp decisions are not biased against foreign firms for non-merger and merger enforcement, respectively. Carree et al. (2010) conclude that "firms from non-European countries have fewer infringements, lower fines, and also lower appeal rates." This is not to say that EU decisions are uncontroversial. In fact, the Commission took several controversial decisions in recent years, including blocking the merger of General Electric and Honeywell (which had been approved by the US competition authorities) and ruling against Google in a case that was dismissed by US authorities five-years prior. But it has also taken many high-profile decisions against EU-based companies as in the case of Alstom and Siemens.

3.2.1 Merger Enforcement

Let us start with Merger enforcement because it is simpler to define and has been extensively studied. Bergman et al. (2010), in particular, study a detailed sample of EU and US merger investigations from 1993 to 2003. Their work is particularly useful because they control for the specifics of each case, and they ask:

what would have been the outcome of the *same* case if it had been investigated by the *other* regulator? They find that the EU was tougher than the US for dominance mergers, in particular those involving moderate market shares. The differences are less stark following the 2004 EU Merger Reform, but the EU is still tougher on mergers involving moderate market shares, and it applies a more aggressive collusion policy than the US (Bergman et al., 2016). We show in the Appendix that merger challenges have increased for DG Comp and remained stable for the DOJ. In an important paper, Kwoka (2017b) shows that the fraction of merger investigations that resulted in enforcement actions decreased between 1996 and 2008. In recent years, the FTC seems to have stopped enforcing mergers when the number of remaining competitors is 5 or more.

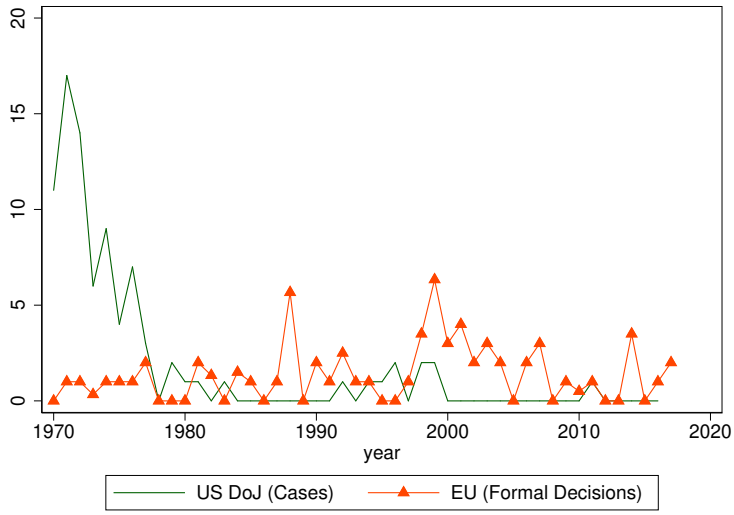
3.2.2 Non-Merger Enforcement

Moving on to non-merger enforcement, we follow the literature and separate the discussion by economic conduct: Abuse of Dominance, and Hard-core Cartels (price-fixing, bid-rigging and market sharing). We discuss other forms of restrictive trade in the Appendix. In order to provide a long time-series of enforcement, we often contrast the number of *cases* pursued by the DoJ to the number of *formal decisions* made by DG Comp. These are different objects. Formal decisions are substantially more restrictive than cases, since the latter can be resolved through commitments or rejections in addition to formal decisions. This biases the series against our prediction. In addition, neither measure covers the full span of enforcement. Both the FTC and individual states have enforcement responsibilities in the US; and many antitrust cases originate by private litigation (particularly outside cartel and mergers, as discussed in OECD (2015)). Similarly, NCAs have enforcement responsibilities in Europe but enforcement data for these additional plaintiffs is available only after the late 1990s/early 2000s – if at all. We include FTC cases in our regression analyses below, but focus on the DoJ here to study long run trends. We also note that DoJ enforcement trends are often used as a proxy of long run enforcement in the US antitrust literature (e.g., Ghosal et al. (2007)). With these limitations, we can make the following claim: enforcement by DG Comp has remained stable while enforcement by the DoJ has decreased significantly.[25]

Abuse of Dominance We begin with Abuse of Dominance, a concept that is arguably more important in Europe than the US. Figure 10 shows that DG Comp Abuse of Dominance enforcement has remained stable or increased since the 1970s, while it has all but disappeared in the US (at least at the DoJ). Indeed the DoJ has brought only 10 cases since 1990 and only one case since 2000. In fact, not only the number of cases

[25]The Appendix provides more detailed information about the various data sources and measurement issues. Figure 43 in the Appendix shows that the number of formal decisions made by DG Comp on non-merger cases has remained relatively stable since 1964. According to Carree et al. (2010), the early upward trend reflects DG Comp's growing legitimacy and jurisdiction, while the 1990s decrease is due to changes in DG Comp's policies such as the creation of a block exemption regulation system and a stronger reliance on comfort letters instead of official decisions. In addition, around 1989 the DG Comp was burdened with enforcement of the then new merger control regulation. Up until the late 1990s, nearly half of the formal decisions related to exemptions (where the practice is allowed to continue) and negative clearance (where the practice is deemed to be in compliance with regulation). Such decisions essentially disappear in recent years, as the commission resolves nearly all such cases without formal decisions. Focusing on the number of infringements (i.e., actual violations), the number of formal decisions has been essentially flat – or even increased since 2000.

Figure 10: *Abuse of Dominance Enforcement, DG Comp vs. DoJ*



Notes: DoJ Annual Reports for the US. Russo et al. (2010) for Europe, extended manually to 2017 based on DG Comp online case database.

has decreased, but the number of investigations has also fallen close to zero.[26]

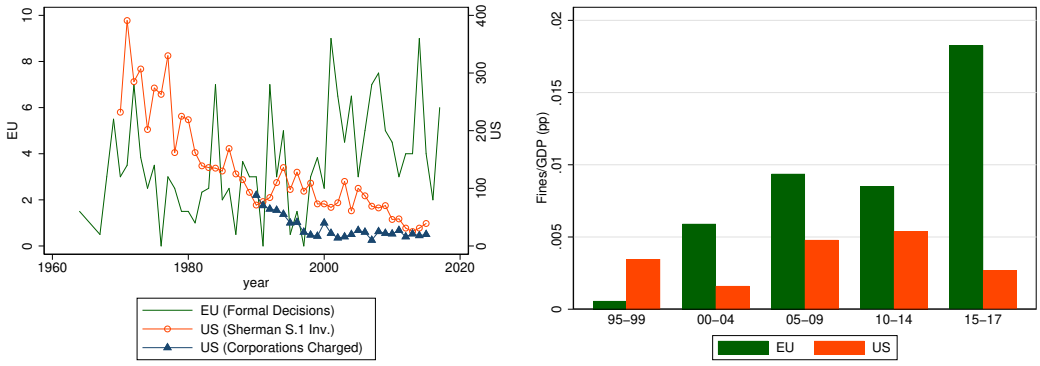
Cartels Let us move on to Cartel enforcement. Figure 11 (left panel) shows the number of DG Comp Formal decisions (left axis) and the number of DoJ Investigations and corporations charged (right axis). DG Comp enforcement is stable/rising while DoJ enforcement is falling. It should be noted, however, that the comparison is complicated. Cartels are typically charged in criminal courts in the US while DG Comp can only pursue civil cases. In addition, we could measure the number of individuals charged, or the number of corporations charged. We show Investigations and Corporations charged in the US because they better reflect the number of violations pursued by the DoJ. In recent years, however, the DoJ has increased its focus on charging individuals as well as corporations – which has resulted in more individuals being incarcerated and for longer periods of time.[27] As a result, one could argue that cartel enforcement has not decreased in the US, or at least not as much as suggested by Figure 11. The increase in EU enforcement, however, is unambiguous.

Figure 11 (right panel) shows that the EU has imposed substantially higher fines for Cartel Cases than the DoJ. The increase in Europe was particularly pronounced after 2000, with total cartel fines increasing from about 600 MM Euros in the 1990s to more than 15 billion from 2005 to 2014 (the last decade with available data). Considering all antitrust cases in Europe and controlling for the number of corporations fined we reach similar conclusions. The average fine per corporation imposed by DG Comp increased from less than 20 MM euros before 2000 to more than 300 MM in 2006-2008 (Russo et al., 2010), while the average fine imposed by DoJ remained under $50 MM for most of the 2000s.

[26] We find similar results including EU NCAs, as shown in Appendix Figure 44. Nearly 40% of cases brought by European NCAs relate to Abuse of Dominance.

[27] This is a stated policy objective (link). See figure 45 in the Appendix for additional details.

Figure 11: *Cartel Enforcement and Fines, DG Comp vs. DoJ*



Notes: DoJ Annual Reports for the US. Russo et al. (2010) for Europe, extended manually to 2017 based on DG Comp case database. Fines are from DoJ Annual Reports and DG Comp Cartel Statistics 2017.

3.3 Product Market Regulation

Let us move on to Product Market Regulation. The theoretical case for product market reforms is straightforward but the empirical issue is that our proxies could be noisy or biased by political window-dressing. Figure 12 shows that this is not the case. We use the OECD's Product Market Regulation indices (PMR).[28] Higher levels of PMR are reflected in higher profit rates. The figure shows the data for 1998, which is the first year when PMRs are available. Countries like Greece and Poland had the highest PMR indices and Gross Profit Rates among advanced economies. By contrast, the US and Great Britain had the lowest regulatory restrictions and profit rates. We confirm that these relationships are statistically significant for profitability and concentration in Appendix table 7.

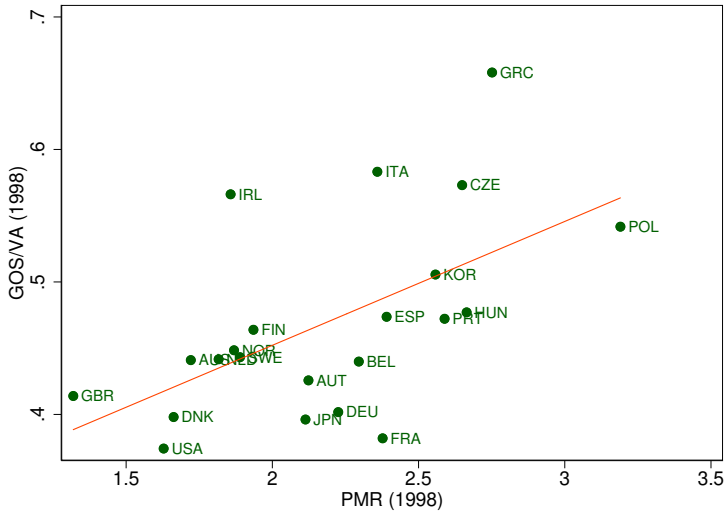
Figure 13 shows the evolution of PMR indices for the US (line) and European countries (dots). The US was a clear leader in PMR in the late 1990s, following the extensive deregulation of the 1980s and 1990s. It obtained the second highest score across all countries, second only to Great Britain. Since then, however, PMR decreased drastically for all EU economies, yet remained stable in the US. Indeed, by 2013, very few countries scored worse than the US – and by a small margin.[29]

How have European countries been able to reduce Regulatory Barriers? They have implemented far more reforms than the US in recent periods (see Appendix Figure 49). Duval et al. (2018) construct a database of major labor and product market reforms across 26 advanced economies and 7 network industries from 1970 to 2013, based on a detailed review of past *OECD Economic Surveys* as well as regulatory

[28]The World Bank and the World Economic Forum also publish measures related to regulatory barriers to competition. Appendix Figure 50 shows that European countries have also improved according to World Bank measures, as well as tangible WEF measures such as the number of days required to open a business. Subjective WEF measures suggest a different story, but they are likely less reliable since they are based on a survey of business executives. We focus on the OECD's measures because they are more widely accepted, detailed and specific. For instance, they are a key tool for the OECD/IMF joint assessment of growth strategies for G20 members. See Pelkmans (2010) for a discussion of the alternate measures of regulatory barriers.

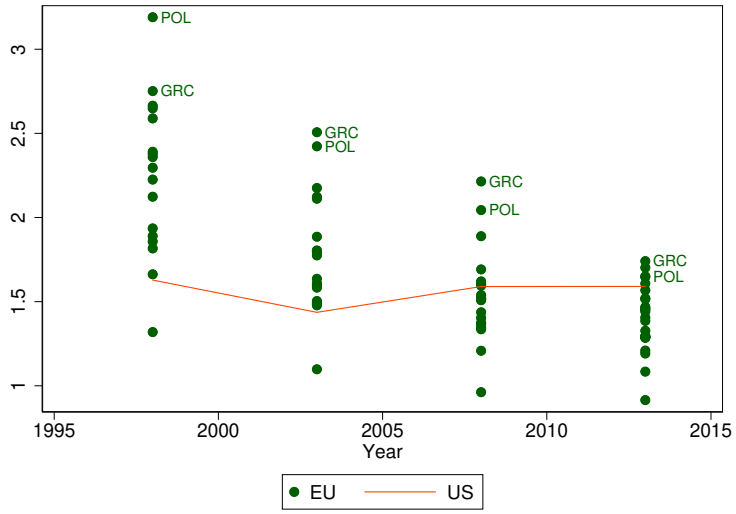
[29]Moreover, some have argued that PMR scores are biased upward in Europe. In particular, Pelkmans (2010) notes that the OECD's PMR indicators (i) neglect areas where EU regulation is particularly strong (e.g., Safety, Health, Environment and Consumer Protection) and (ii) focus on individual countries, without accounting for the benefits of a single market for regulation and competition.

Figure 12: *PMR vs. Profits (1998)*



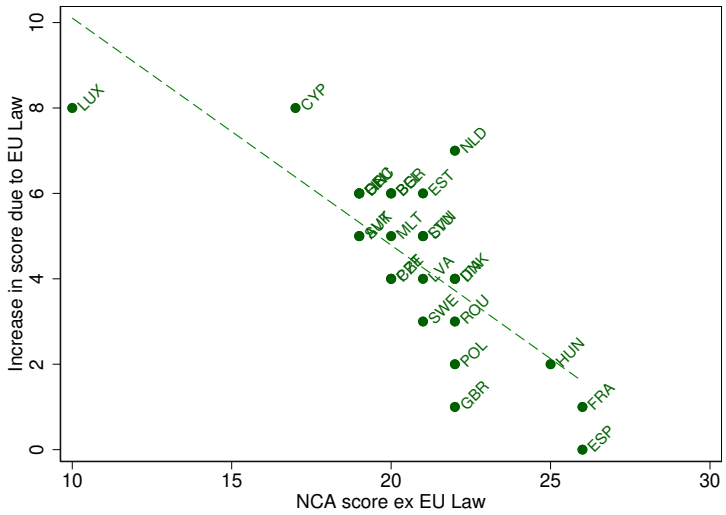
Note: PMR from OECD. Profitability from OECD STAN for Non-Agriculture Business sector excluding RE. Sample includes EU countries plus AUS, CAN, JPN, KOR, NOR, CHE and USA.

Figure 13: *Product Market Regulation: US vs EU*



Note: OECD PMR. Figure includes all countries in EU by 2004. PMR scores for some countries available only in recent years.

Figure 14: *Effect of EU Law Integration on Country Antitrust Scores*



Source: Figure plots the increase in Antitrust Policy score from integration of EU law to Country-specific law, as measured by Hylton and Deng (2006). Updated country scores downloaded manually from link.

indicators.[30] Positive reforms are coded as 1 while counter-reforms are coded as -1. Duval et al. (2018) use a Diff-in-Diff framework to show that the implementation of reforms increases output.

4 Test of Proposition 2: Cross-Sectional Implications

A classic idea in the literature on credible monetary policy is that countries with weak institutions (stronger biases or commitment problems) benefit from external commitments. Similarly, proposition 2 predicts that countries with initially high β experience larger improvements in competition thanks to EU institutions. Let us test this proposition. We define weak countries as those with initially weak antitrust policies, large barriers to entry or weak corruption controls.

4.1 Antitrust

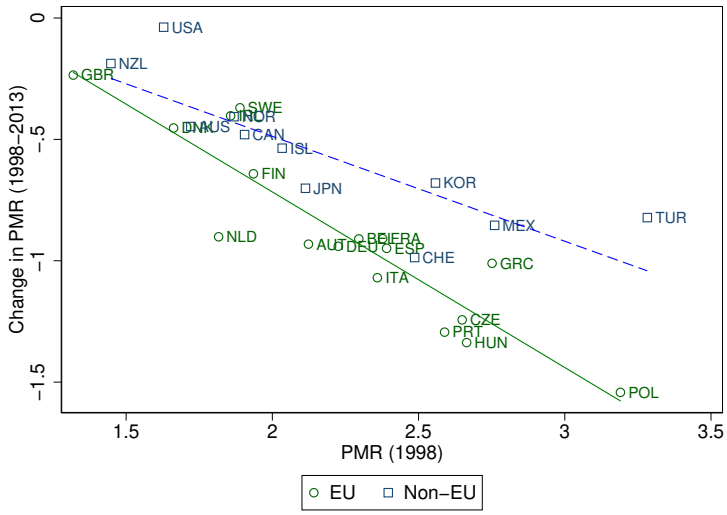
Figure 14 shows the increase in Hylton and Deng's Antitrust policy score from integrating EU law into each country's antitrust law. As predicted by Proposition 2, countries with initially weaker antitrust policies experience larger improvements from integration with the EU.

4.2 Product Market Regulation

Figure 15 plots the change in PMR from 1998 to 2013 against the starting value in 1998. There has been a global convergence towards less regulation, and, consistent with our model, the convergence is faster for EU countries than for non-EU countries. The difference is statistically significant (t-stat of -2.29).

[30]The seven network industries are those covered by the OECD's indicators of regulation, which include electricity, gas, telecommunications, postal services, rail transport, air transport and road transport.

Figure 15: *PMR Convergence: EU vs. Other Countries*



Note: OECD PMR. Includes all countries with a PMR score as of 1998.

The differences are even stronger when we consider initial corruption control. The Left Panel of Figure 16 plots changes in PMR indices against the World Bank's Corruption Control index, as of 1996.[31] PMRs decreased precisely at those countries with initially weaker institutions in Europe, while the relationship is significantly weaker in the rest of the world. Finally, the Right Panel of Figure 16 shows that these results are indeed driven by the number of implemented Product Market Reforms from 1998 to 2013, as measured by Duval et al. (2018).[32]

5 Proposition 3: Political Expenditures

Proposition 3 predicts lower political expenditures when regulators are more difficult to influence. This section tests this prediction by studying total lobbying and campaign contributions in the EU and in the US. Political expenditures not only influence antitrust and regulatory agencies, but also the courts, and the politicians that design (and may change) the institutions, select the judges, allocate funding and choose the agencies' leadership. They affect competition policy in many ways beyond actual antitrust enforcement.

5.1 Lobbying

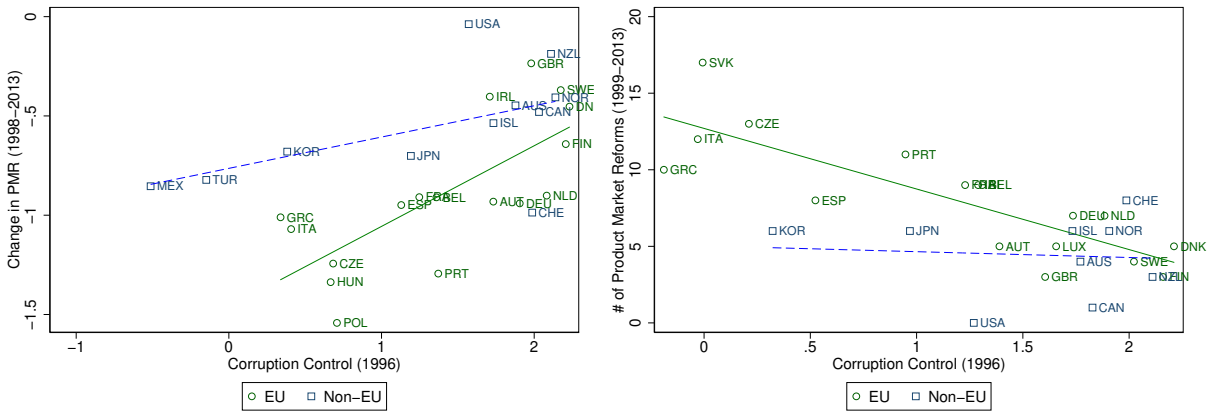
Expenditures Figure 17 shows total lobbying expenditures to the US Federal government and to European Union institutions.[33] Data for the US come from the Center for Responsive Politics, which in turn sources data from the Federal Lobbying Disclosure Act Database. Data for Europe is based on LobbyFacts.com,

[31] We find similar results using Government Effectiveness instead of Corruption Control

[32] Appendix Figure 48 shows that convergence of PMR indices across levels of Corruption Control is unique to the EU. Non-EU countries continue to exhibit a strong positive relationship between PMR and Corruption Control as of 2013.

[33] We do not have comparable data for State level lobbying but it is not likely to change our main result that lobbying is higher in the US and would probably increase it. Total state-level lobbying expenditures in 20 states in the US where we have data (which account for 58% of US GDP) totaled $1.43 BN in 2016 – nearly as much as total Lobbying to the EU (FollowTheMoney.org).

Figure 16: *PMR Convergence and Reforms vs. Initial Corruption Control*



Notes: Left panel shows the change in each country's PMR score from 1998 to 2013 against the World Bank's measure of Corruption Control as of 1996. Includes all countries with a PMR score as of 1998 and a corruption control score as of 1996. Right panel shows the number of major product market reforms implemented from 1999 to 2013 (as measured by Duval et al. (2018)) against Corruption Control in 1996. The differences in slopes are statistically significant: the t-stat for left panel is 2.19, controlling for the starting PMR. T-stat for right panel is 2.16.

which sources data from the EU Transparency Register. Lobbying expenditures in the US are more than twice as large as in Europe and the share of Lobbying done by Business, Lawyers and Lobbyists is higher in the US (87%) than in Europe (70%). The European lobbying data has some issues but the differences are so large that these issues are unlikely to alter our main result.[34]

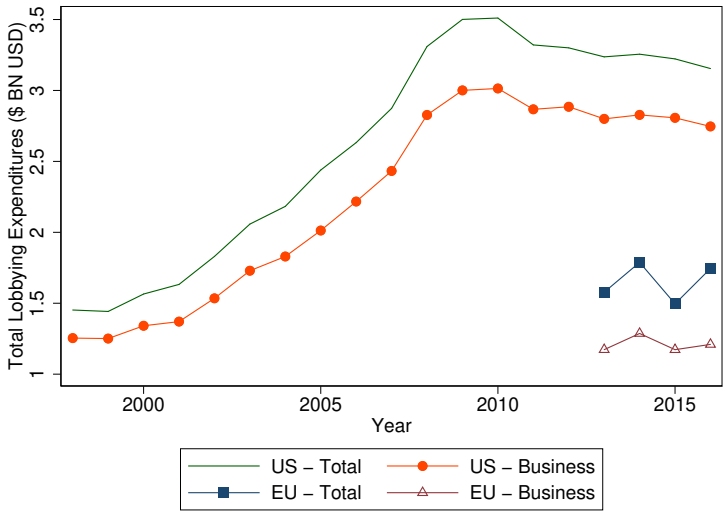
We can perform a potentially more precise comparison using firm-level data. In the EU, Dellis and Sondermann (2017) estimate an elasticity of lobbying expenditures to log-sales of 0.153 in 2017. Using a sample of US firms form Compustat, we obtain an elasticity more than four times larger (0.620).[35] The same results hold if we control for sector fixed effects. Large firms in the US spend a lot more on lobbying, and this explains the large differences that we observe in the aggregate.

The sharp increase in lobbying in the US during the 2000's can shed light on the divergence between the US and the EU. In our baseline model there is no aggregate uncertainty so when policy makers choose θ in

[34]The direction of the bias is unclear. EU lobbying might be *under-estimated* because joining the Transparency Register is not mandatory. However, lobbying expenditures are extremely skewed, and large players are well captured in the data. Greenwood and Dreger (2013) estimated as of 2013 that 75% of businesses and 60% of NGOs active in engaging EU political institutions were in the Register, and the number of registrants has increased by more than 50% since then. On the other hand Lobbying may be *over-estimated* due to double-counting: the data contains the corporations that employ lobbying intermediaries as well as the lobbying intermediaries themselves. There are also some measurement issues with small firms and we follow LobbyFacts.com in applying restrictions based on the number of European Parliament passes and European Commission meetings to mitigate these issues. In particular, we drop observations in the top 5% of Lobbying expenditures by year for firms that have no European Parliament passes and no European Commission meetings. We also replace lobbying expenditures for the University College Dublin National University of Ireland, Dublin in 2015 with the prior year's quantity because it is an extreme outlier. The totals after applying these restrictions roughly match those reported in the media (e.g., link). Note also that most firms report ranges of lobbying expenditures rather than specific amounts. We take the mid-point of all ranges in our estimates. Annual totals for the EU are based on the complete register available through LobbyFacts.eu as of year-end 2012, 2013, 2014 and 2015. Ideally we would separate Business from Lawyers and Lobbyists, but it is a known issue for the Transparency Register that many businesses report as Lawyers and Lobbyists.

[35]We are grateful to Indraneel Chakraborty, Richard Evans and Rüdiger Fahlenbrach for providing a mapping from CRP's UltOrg to Compustat $gvkeys$

Figure 17: *Lobbying Expenditures: US vs EU*



Source: US Lobbying from the Center for Responsive Politics. EU Lobbying from LobbyFacts.com. See caveats for EU lobbying totals in text. US Business sector includes Agribusiness, Electronics, Construction, Defense, Energy, FIRE, Health, Lawyers and Lobbyists, Misc. Business and Transportation. EU business includes Professional consultancies/law firms/self-employed consultants and In-house lobbyists and trade/business/professional associations.

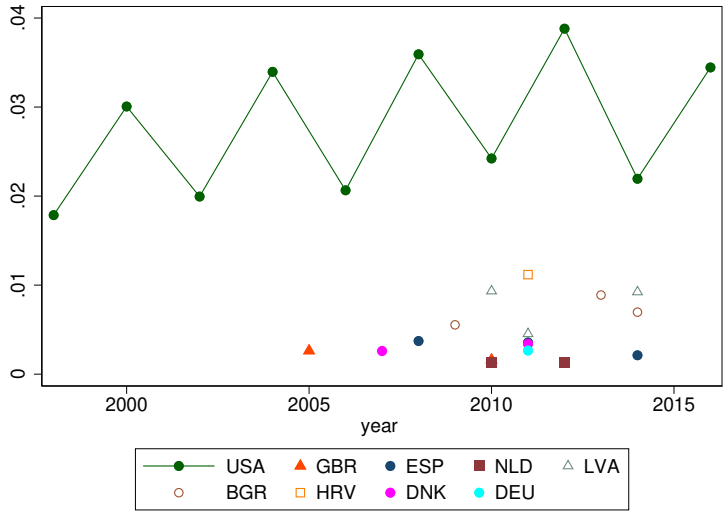
the first period, they can forecast exactly how much influence lobbyists will have in the second period. It is doubtful that EU policymakers really thought that the EU would end up with freer markets than the US. The increase in lobbying over the past 20 years, however, has come as a surprise. It might reflect the increasing cost of political campaigns, globalization that increases profits relative to (domestic) lobbying costs, or perhaps other forces (such as polarization) that make the political system more vulnerable to lobbying. The important point is that the shocks made regulatory independence more important than anticipated. According to this interpretation, the EU was lucky to set up strongly independent institutions before the lobbying shock hit. The Appendix formalizes this result using our model.

Outcomes. Following the logic of our model, lobbyists should be more likely to succeed in the US than in the EU. Mahoney (2008) performs a large-scale comparative study of the two systems, researching the work of 150 lobbyists fighting over 47 different policy issues, half in the US and half in the EU. She concludes that *"In the US, 89% of corporations and 53% of trade associations succeed, while [..] 60% of citizen groups and 63% of foundations fail in their lobbying goals [..] In the EU, the success rates are 57% for trade associations and 61% for lobbying firms but citizen groups and foundations [..] win at equal rates (56% and 67%)."* She argues that these differences arise because US legislators depend on wealthy interests for campaign contributions. We therefore turn to campaign finance next.

5.2 Campaign Contributions

Differences in campaign contributions between the US and the EU are even larger than differences in lobbying expenditures. Figure 18 shows total campaign contributions for federal elections in the US and total

Figure 18: *Campaign Expenditures (pp of GDP)*



Source: Campaign expenditures in percentage points of GDP. US expenditures include only federal elections from the Center for Responsive Politics, available at link. EU expenditures include total gross campaign expenditures in a given country's general election. EU data from EU (2015) for all countries except Germany, for which we use Bundestags-Drucksache (2013).

campaign expenditures for several European countries relative to GDP. The sample of European countries is primarily based on EU (2015), and is representative of the European economy. Campaign contributions in the US are many times larger than in Europe. As with lobbying, the distribution of contributions is extremely skewed, with an outsized share coming from large businesses and very wealthy individuals.

The role of money and business interests in US politics has been documented in several dimensions. The Vital Statistics on Congress, available here, show that the cost of winning a House seat doubled since 1986, while the cost of winning a Senate seat increased by 60%. Epstein et al. (2013) show that Supreme Court decisions have become increasingly business-friendly. Competition agencies may affected by this, through the actions of elected politicians. For instance, upon initiating its investigation of Google, the FTC received more than 13 letters from US congressmen, including one from Jared Polis which stated that *"application of antitrust against Google would be a woefully misguided step that would threaten the very integrity of our antitrust system, and could ultimately lead to Congressional action resulting in a reduction in the ability of the FTC to enforce critical antitrust protections."* European members of parliament would be unlikely to write such a letter because of DG Comp's independence. Mehta et al. (2017) show that political connectedness and political expenditures lead to favorable outcomes in US Merger reviews.

6 Antitrust Overreach?

In the previous sections we have tested and validated the main predictions of the model. European integration has led to stronger antitrust enforcement, decreasing barriers to entry, and limited lobbying. We have found greater benefits for countries with weaker institutions. It is theoretically possible, however, that EU enforcement could become too stringent. In this section we ask if there is a trade-off between competition

and innovation.

In the case of product market regulations, existing research has already documented significant benefits of reform. Alesina et al. (2005); Ciccone and Papaioannou (2007); Klapper et al. (2006); Thum-Thysen and Canton (2017); Cette et al. (2018); Griffith et al. (2010) and Duval and Furceri (2016), for example, find a negative relationship between product market regulations and measures of investment, entry, technological change, and growth. Griffith et al. (2010), in particular, find that reforms carried out under the EU Single Market Program "were associated with increased product market competition, as measured by a reduction in average profitability, and with a subsequent increase in innovation intensity and productivity growth for manufacturing sectors."

Antitrust enforcement is more complicated and might involve a trade-off between current consumer surplus and innovation or investment.[36] Stronger enforcement in Europe might come at the cost of lower investment and/or lower innovation than in the US. We test this idea by regressing outcomes in Europe (concentration, profitability and TFP growth) on the number of antitrust cases in the corresponding industry, controlling for changes in concentration, profitability, TFP and/or enforcement in the US. Adding the US controls allows us to capture unobserved but common technological changes at the industry level that may affect equilibrium concentration, profit rates, and the need for enforcement. We define the change in top-4 firm concentration ratios in industry j and year t in Europe as $\Delta log\left(CR4\right)_{j,t-2,t}^{EU} \equiv log\left(CR4_{j,t}^{EU}\right) - log\left(CR4_{j,t-2}^{EU}\right)$ and the number of Antitrust cases in Europe as $\#\left\{\text{Cases}\right\}_{j,t-2,t}^{EU}$. For the US, we similarly define $\Delta log\left(CR4\right)_{t-2,t}^{US}$ and the number of US cases, $\#\left\{\text{Cases}\right\}_{j,t-2,t}^{US}$.[37]

Table 4 presents our results. Columns 1 and 2 of Table 4 show that stronger enforcement leads to less concentration and lower profit rates, respectively. These results show that the impact of enforcement is material. Column 3 studies the trade-off between enforcement and innovation and shows that stronger enforcement in Europe is correlated with faster TFP growth. Figure 19 presents a bin-scatter plot of the productivity and enforcement relationship, which appears fairly robust (results for profits and concentration are similar). These results are consistent with previous work linking country-level competition policies to TFP growth (Buccirossi et al., 2013; Voigt, 2009). We expand on this literature by studying outcomes of actual enforcement at the more granular industry-level; and using the US as a control group for EU enforcement activity.

[36] In Lim and Yurukoglu (2018), for instance, regulators cannot commit to future rates of returns on capital. In addition, regulators may lack the knowledge to understand the impact of innovations on consumer welfare, or they may under-estimate the efficiency benefits of large firms. Firm lobbying can add value by communicating specialized information to these regulators. This is reflected in the theoretical literature on lobbying that emphasizes three distinct modeling traditions: contests for policy rent, strategic information transmission, and multiple means models (Gregor, 2011).

[37] In unreported tests, we regress the double differences of changes in concentration, profitability and TFP between the EU and US

$$\Delta^2 log\left(CR4\right)_{j,t-2,t}^{EU-US} = \Delta log\left(CR4\right)_{j,t-2,t}^{EU} - \Delta log\left(CR4\right)_{j,t-2,t}^{US}$$

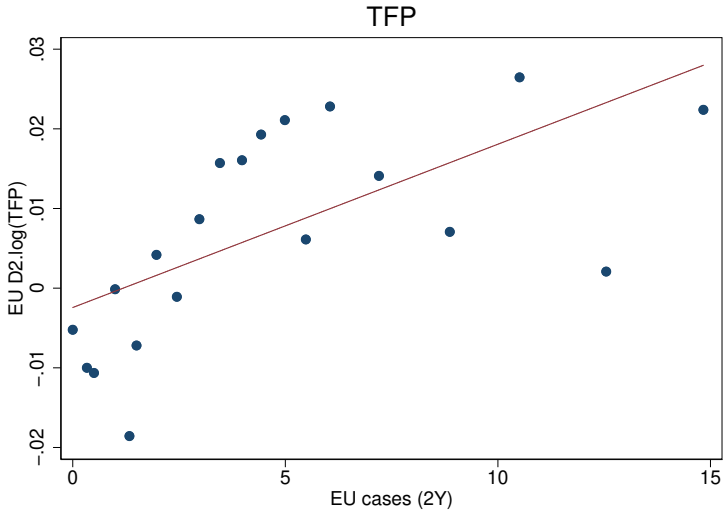
on the differences in enforcement between regions, $\Delta Cases_{,j,t}^{EU-US} \equiv \#\left\{\text{Cases}\right\}_{j,t}^{EU} - \#\left\{\text{Cases}\right\}_{j,t}^{US}$ .This specification restricts the coefficient on US cases and enforcement to minus one. It yields consistent results.

Table 4: *Real effects of Differences in Cases*

Table reports panel regression results of the effects of European enforcement activity on changes in concentration, profitability and TFP, controlling for the corresponding changes and cases in the US. Concentration measures based on ORBIS for Europe and Compustat for the US. Profit rates from OECD STAN, defined as the ratio of gross operating surplus to gross output. Value added-based TFP growth from EU KLEMS 2017. Enforcement activity gathered manually from the DoJ, FTC and DG Comp websites. Industry segments based on EU KLEMS. Standard errors clustered at the industry-level in brackets. + p<0.10, * p<0.05, ** p<.01.

	(1) $\Delta CR4^{EU}_{t-2,t}$	(2) $\Delta PR^{EU}_{t-1,t+1}$	(3) $\Delta \log(TFP)^{EU}_{t-2,t}$
$\#Cases^{EU}_{t-1,t}$	-0.002^{+}	-0.001*	0.002*
	(0.001)	(0.000)	(0.001)
$\#Cases^{US}_{t-1,t}$	0.001	-0.000	0.001
	(0.001)	(0.000)	(0.001)
$\Delta CR4^{US}_{t-2,t}$	0.020		
	(0.065)		
$\Delta PR^{US}_{t-1,t+1}$		0.176*	
		(0.069)	
$\Delta \log(TFP)^{US}_{t-2,t}$			0.274**
			(0.075)
Industry FE	Y	Y	N
R^2	0.02	0.15	0.12
N	210	432	390

Figure 19: *Enforcement and TFP*



Notes: Bin-scatter plot of EU changes in TFP vs. EU enforcement activity.

7 Conclusion

Europe and the US have similar institutions for market regulation. Over the past 20 years, however, we observe a significant divergence in actual policies, from product market regulations to antitrust enforcement. We document and explain these trends. Even though EU institutions resemble American ones in terms of goals, scope and doctrine, they often operate with more political independence than their American counterparts. This is true of the two leading supra-national institutions in the EU: the European Central Bank (ECB) and the Directorate-General for Competition (DG Comp). DG Comp is more independent than the Department of Justice (DoJ) or the Federal Trade Commission (FTC). We explain these differences as the equilibrium of a bargaining game among sovereign nations. We test and confirm the predictions of our model. The comparison with Europe is useful to understand the US experience, and especially the rise in lobbying which is an important topic for future research.

References

Acemoglu, D., S. Johnson, and J. A. Robinson (2005, 12). Chapter 6 institutions as a fundamental cause of long-run growth. *1*, 385–472.

Alemani, E., C. Klein, I. Koske, C. Vitale, and I. Wanner (2013). New indicators of competition law and policy in 2013 for oecd and non-oecd countries.

Alesina, A., S. Ardagna, G. Nicoletti, and F. Schiantarelli (2005, jun). Regulation and investment. *Journal of the European Economic Association 3*(4), 791–825.

Alesina, A. and F. Giavazzi (2006). *The Future of Europe: Reform or Decline*. MIT Press. Translations: Greek, Korean, Italian, Portuguese, Spanish.

Autor, D., D. Dorn, L. Katz, C. Patterson, and J. V. Reenen (2017a, jan). Concentrating on the fall of the labor share. Technical report, mimeo.

Autor, D., D. Dorn, L. F. Katz, C. Patterson, and J. V. Reenen (2017b). The fall of the labor share and the rise of superstar firms.

Bailey, J. and D. Thomas (2015). Regulating away competition: The effect of regulation on entrepreneurship and employment. *Mercatus Working Paper*.

Bajgar, M., G. Berlingieri, S. Calligaris, C. Criscuolo, and J. Timmis (2019). Industry concentration in europe and north america. Technical report, OECD.

Balassa, B. (1964). The purchasing-power parity doctrine: A reappraisal. *Journal of Political Economy 72*(6), 584–596.

Baqaee, D. R. and E. Farhi (2018). The macroeconomic impact of microeconomic shocks: Beyond hulten's theorem.

Barkai, S. (2017). Declining labor and capital shares. University of Chicago.

Barro, R. J. and D. B. Gordon (1983). Rules, discretion and reputation in a model of monetary policy. *Journal of Monetary Economics 12*(1), 101 – 121.

Basu, S. (2019). Are price-cost mark-ups rising in the united states? a discussion of the evidence.

Berger, D. (1998). *Law and Competition in Twentieth Century Europe*.

Bergman, M., M. Coate, M. Jakobsson, and S. Ulrik (2010). Comparing merger policies in the european union and the united states. *Review of Industrial Organization 36*, 305–331.

Bergman, M. A., M. B. Coate, A. T.V.Mai, and S. W. Ulrick (2016). Does merger policy converge after the 2004 european union reforms? *Working Paper*.

Bork, R. (1978). *The Antitrust Paradox*. New York: Basic Books.

Bradford, A. and A. S. Chilton (2018, sep). Competition law around the world from 1889 to 2010: The competition law index. *Journal of Competition Law & Economics 14*(3), 393–432.

Bradford, A., J. Robert J. Jackson, and J. Zytnick (2017). Is eu merger control used for protectionism? an empirical analysis. *Working Paper*.

Buccirossi, P., L. Ciari, T. Duso, G. Spagnolo, and C. Vitale (2011). Measuring the deterrence properties of competition policy: The competition policy indexes. *Journal of Competition Law & Economics 7*(1), 165–204.

Buccirossi, P., L. Ciari, T. Duso, G. Spagnolo, and C. Vitale (2013). Competition policy and productivity growth: An empirical assessment. *The Review of Economics and Statistics 95*(4), 1324–1336.

Bundestags-Drucksache (2013). Parliamentary paper no. 17/12340.

Caballero, R. J., E. Farhi, and P.-O. Gourinchas (2017a, May). Rents, technical change, and risk premia accounting for secular trends in interest rates, returns on capital, earning yields, and factor shares. *American Economic Review Papers & Proceedings 107*(5), 614–20.

Caballero, R. J., E. Farhi, and P.-O. Gourinchas (2017b, May). Rents, technical change, and risk premia accounting for secular trends in interest rates, returns on capital, earning yields, and factor shares. *American Economic Review 107*(5), 614–20.

Calvo, G. A. (1978). On the time consistency of optimal policy in a monetary economy. *Econometrica 46*(6), 1411–1428.

Carree, M., A. Günster, and M. P. Schinkel (2010, Mar). European antitrust policy 1957–2004: An analysis of commission decisions. *Review of Industrial Organization 36*(2), 97–131.

CEA (2016, April). Benefits of competition and indicators of market power. Issue Brief.

Cette, G., L. Koehl, and T. Philippon (2019). Labor shares. Working Paper.

Cette, G., J. Lopez, and J. Mairesse (2018, March). Rent creation and sharing: New measures and impactson tfp. Working Paper 24426, National Bureau of Economic Research.

Ciccone, A. and E. Papaioannou (2007, may). Red tape and delayed entry. *Journal of the European Economic Association 5*(2-3), 444–458.

Claus, J. and J. Thomas (2001). Equity premia as low as three percent? evidence from analysts' earnings forecasts for domestic and international stock markets. *The Journal of Finance 56*(5), 1629–1666.

Combes, E. (2012). "les virtues cachées du low cost aérien". Technical report, Fondapol-PUF.

Covarrubias, M., G. Gutiérrez, and T. Philippon (2019). From good to bad concentration? u.s. industries over the past 30 years. *NBER Macroannuals*.

Crouzet, N. and J. Eberly (2018a). Intangibles, investment, and efficiency. *AEA Papers and Proceedings*.

Crouzet, N. and J. Eberly (2018b). Understanding weak capital investment: the role of market concentration and intangibles. Technical report, Jackson Hole Economic Policy Symposium.

Davis, S. (2017). Regulatory complexity and policy uncertainty: Headwinds of our own making. Booth Working Paper.

De-Loecker, J., J. Eeckhout, and G. Unger (2019). The rise of market power and the macroeconomic implications.

Debrun, X. (2001, July). Bargaining over emu vs. ems: Why might the ecb be the twin sister of the bundesbank? *The Economic Journal Vol. 111*(472), 566–590.

Dellis, K. and D. Sondermann (2017). Lobbying in europe: new-firm level evidence. ECB Working Paper.

Djankov, S., R. La Porta, F. Lopez-de Silanes, and A. Shleifer (2002). The regulation of entry. *The Quarterly Journal of Economics 117*(1), 1–37.

Dottling, R., G. Gutiérrez, and T. Philippon (2017). Is there an investment gap in advanced economies? if so, why? mimeo.

Duval, R. and D. Furceri (2016). The effects of labor and product market reforms: The role of macroeconomic conditions and policies. *IMF Working Paper*.

Duval, R., D. Furceri, B. Hu, J. T. Jalles, and H. Nguyen (2018). A narrative database of major labor and product market reforms in advanced economies. *IMF Working Paper*.

Economides, N. (2002). U.s. telecommunications today. In *IS Management Handbook*.

Epstein, L., W. M. Landes, and R. A. Posner (2013). How business fares in the supreme court. *Minnesota Law Review 1431*.

EU (2015). Party financing and referendum campaigns in eu member states.

Faccio, M. and L. Zingales (2017, January). Political determinants of competition in the mobile telecommunication industry. Working Paper 23041, National Bureau of Economic Research.

Faure-Grimaud, A. and D. Martimort (2003). Regulatory inertia. *The RAND Journal of Economics 34*(3), 413–437.

Faure-Grimaud, A. and D. Martimort (2007). Political stabilization by an independent regulator. In *The Political Economy of Antitrust*. Elsevier.

Feinberg, R. M. and K. M. Reynolds (2010). The determinants of state-level antitrust activity. *The Review of Industrial Organization 37*(179-196).

First, H. and S. Weber Waller (2013). Antitrust's democracy deficit. *Fordham Law Review*.

Foncel, J., V. Rabassa, and M. Ivaldi (2007). The significant impediment of effective competition test in the new european merger regulation. In *The Political Economy of Antitrust*. Elsevier.

Furman, J. (2015). Business investment in the united states: Facts, explanations, puzzles, and policies.

Ganapati, S. (2018). Oligopolies, prices, output, and productivity.

Ghosal, V., J. Harrington, and J. Stennek (2007). Issues in antitrust enforcement. In *The Political Economy of Antitrust*. Elsevier.

Gilchrist, S., R. Schoenle, J. Sim, and E. Zakrajsek (2017). Financial heterogeneity and monetary union. *Working Paper*.

Greenwood, J. and J. Dreger (2013). The transparency register: A european vanguard of strong lobby regulation? *Interest Groups & Advocacy*.

Gregor, M. (2011). Corporate lobbying: A review of the recent literature.

Griffith, R., R. Harrison, and H. Simpson (2010, apr). Product market reform and innovation in the EU. *Scandinavian Journal of Economics 112*(2), 389–415.

Grossman, G. and E. Helpman (1994, September). Protection for sale. *The American Economic Review 84*(4), 833–850.

Grullon, G., Y. Larkin, and R. Michaely (2019). Are us industries becoming more concentrated? *Review of Finance*.

Gutiérrez, G. (2017). Investigating global labor and profit shares.

Gutiérrez, G. and T. Philippon (2017a). Declining competition and investment in the u.s.

Gutiérrez, G. and T. Philippon (2017b). Investment-less growth: An empirical investigation. *Brookings Papers on Economic Activity Fall*.

Gutiérrez, G. and S. Piton (2019). Revisiting the global decline in the (non-housing) labor share.

Hall, R. E. (2018). New evidence on the markup of prices over marginal costs and the role of mega-firms in the us economy. NBER WP 24574.

Hammonds, S. D. (2001). When calculating the costs and benefits of applying for corporate amnesty, how do you put a price tag on an individual's freedom? *National Institute on While Collar Crime*.

Haskel, J. and S. Westlake (2017). *Capitalism without Capital*. Princeton University Press.

Hylton, K. N. and F. Deng (2006). Antitrust around the world: An empirical analysis of the scope of competition laws and their effects. *Antitrust Law Journal*.

Institute, A. A. (2013). Summary of section 7 of the clayton act. Technical report.

Jabko, N. (2012). *Playing the Market: A Political Strategy for Uniting Europe, 1985-2005*. Cornell University Press.

Jens, H. and S. Johannes (2004). Competition policy in central eastern europe in the light of eu accession. *JCMS: Journal of Common Market Studies 42*(2), 321–345.

Jones, C., G. Gutiérrez, and T. Philippon (2019). Entry costs and the macroeconomy. NBER Working Paper 25609.

Jorgenson, D. W. (1963). Capital theory and investment behavior. *American Economic Review 53*(2), 247–259.

Kalemli-Ozcan, S., B. Sorensen, C. Villegas-Sanchez, V. Volosovych, and S. Yesiltas (2015). How to construct nationally representative firm level data from the orbis global database. Technical report, National Bureau of Economic Research.

Klapper, L., L. Laeven, and R. Rajan (2006, dec). Entry regulation as a barrier to entrepreneurship. *Journal of Financial Economics 82*(3), 591–629.

Koske, I., I. Wanner, R. Bitett, and O. Barbiero (2015). The 2013 update of the oecd product market regulation indicators: policy insights for oecd and non-oecd countries. *OECD Economics Department Working Papers, No. 1200.*.

Kwoka, J. (2015). *Mergers, Merger Control, and Remedies*. MIT Press.

Kwoka, J. (2017a). A response to the ftc critique. Working paper.

Kwoka, J. and L. J. White (2014). *The Antitrust Revolution* (6 ed.). Oxford University Press.

Kwoka, J. E. (2017b). U.s. antitrust and competition policy amid the new merger wave. *Washington Center for Equitable Growth: Working Paper Series*.

Kydland, F. E. and E. C. Prescott (1977). Rules rather than discretion: The inconsistency of optimal plans. *Journal of Political Economy 85*, 473–490.

Leucht, B. (2009). *Transatlantic policy networks in the creation of the first European anti-trust law: mediating between American anti-trust and German ordo-liberalism*, pp. 56–73. United Kingdom: Routledge.

Leucht, B. and M. Marquis (2013). *The Historical Foundations of EU Competition Law*, Chapter American Influence on EEC Competition Law. Oxford University Press.

Lim, C. and A. Yurukoglu (2018). Dynamic natural monopoly regulation: Time inconsistency, moral hazard, and political environments. *The Journal of Political Economy*.

Mahoney, C. (2008). *Brussels versus the Beltway*. Georgetown University Press.

Mehta, M. N., S. Srinivasan, and W. Zhao (2017). Political influence and merger antitrust reviews. *Working Paper*.

North, D. C. (1990). *Institutions, Institutional Change, and Economic Performance*. New York: Cambridge University Press.

OECD (1999). Regulatory reform in the united states. *OECD Reviews of Regulatory Reform*.

OECD (2015). Relationship between public and private antitrust enforcement. *Report by Competition Comittee*.

Pelkmans, J. (2010). Product market reforms in eu countries: Are the methodology and evidence sufficiently robust? *CEPS Working Document No. 332*.

Piketty, T. and G. Zucman (2014, may). Capital is back: Wealth-income ratios in rich countries 1700-2010. *The Quarterly Journal of Economics 129*(3), 1255–1310.

Rajan, R. G. and L. Zingales (2003). *Saving Capitalism from the Capitalists*. New York: Crown Business.

Rogoff, K. (1985). The optimal degree of commitment to an intermediate monetary target. *The Quarterly Journal of Economics 100*(4), 1169–1189.

Russo, F., M. P. Schinkel, A. Günster, and M. Carree (2010). *European Commission Decisions on Competition: Economic Perspectives on Landmark Antitrust and Merger Cases*. Cambridge University Press.

Shapiro, C. (2018). Antitrust in a time of populism. *International Journal of Industrial Organization*.

Syverson, C. (2004, December). Market structure and productivity: A concrete example. *Journal of Political Economy*.

Syverson, C. (2019, January). Macroeconomics and market power: Facts, potential explanations, and open questions. Technical report, Brookings Economic Studies.

Thum-Thysen, A. and E. Canton (2017). Estimating mark-ups and the effect of product market regulations in selected professional services sectors: A firm-level analysis. *European Commission Discussion Paper 046*.

Vita, M. and D. Osinski (2016). John kwoka's mergers, merger control, and remedies: A critical review.

Voigt, S. (2009). The effects of competition policy on development: Cross-country evidence using four new indicators. *The Journal of Development Studies 45*(8), 1225–1248.

Werden, G. J. and L. M. Froeb (2018). Don't panic: A guide to claims of increasing concentration. *Antitrust*.

Zeitz, D. (2009). Overview of microeconomic reforms undertaken by eu member states based on the micref database. *European Commission*.

Appendices: Not Intended for Publication

We provide one appendix for each main section of the paper, along with a Data Appendix.

- Appendix A focuses on US and EU competition measures
- Appendix B provides additional results on prices and mark-ups
- Appendix C presents several model extensions
- Appendix D provides additional tests of model predictions
- Appendix E describes our data sources and definitions

A Appendix for Section 1: Stylized Facts

Table 5 summarizes a wide range of measures of competition for the US and Europe. For each measure, it reports the average value over two periods selected to avoid peaks and troughs in the economic cycle: 1997 to 1999 and 2013 to 2015. The rest of this section provides additional details on the data sources, definitions and results (including plots) underlying each row of the table. To facilitate comparison across measures, all results are based on the non-agriculture business sector excluding Finance – except for concentration where we include Finance.[38]

Before diving into the details, it is useful to make two observations. First, virtually all measures remained stable in Europe yet deteriorated in the US. Investment relative to profits (I/GOS) declined in both regions – consistent with the rise of intangibles as emphasized in Crouzet and Eberly (2018b) and Dottling et al. (2017). But the decline is much larger in the US.

Second, estimates of the level and change in profits are broadly consistent between firm and industry-level data. Take accounting profits, for example. Firm-level pretax income relative to sales increases from 7.5 to 8.5% in the US. Operating surplus to sales rises from 11.1% to 13.1%. In Europe, OS/PROD drops by 1.9%, while Pretax Income/Sales drops by 1.7%. Similarly, estimates of economic profits rise by similar amounts. Average mark-ups adjusted for the cost of debt and equity (see below for definitions) increase by 2.2%. This implies an increase of 2.0% in profits relative to sales and 4.1% in profits relative to value added, assuming a 50% intermediate input rate as in Basu (2019). The corresponding profit share of value added increased by 5.6%. Similarly, for Europe, the average mark-ups rises from 101.3 to 102.1, which implies an increase in profits/sale of 0.8% and an increase in profit share of 1.7%. The profit share based on industry data decreased by 0.3%.

Operating Margin. Figure 20 plots three measures of operating margins for the US and Europe. All measures are taken directly from OECD STAN by computing the weighted average across countries x industries. As shown, the US used to exhibit lower measures of operating profitability yet, today, exhibits equal or higher profits across all measures.

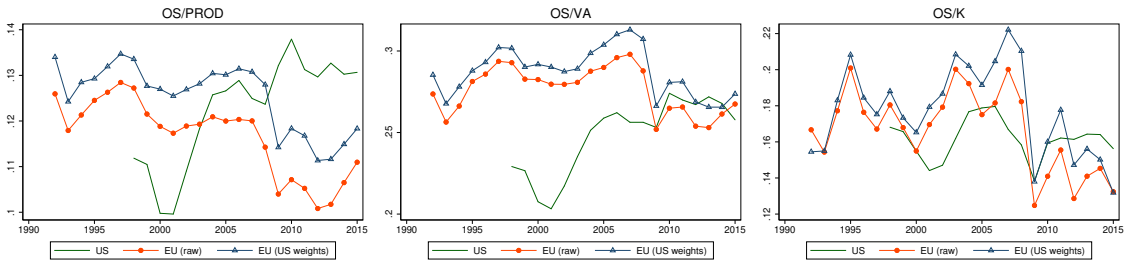
[38] We exclude finance and non-business sectors due to difficulties in measuring the labor share and profits in industry data for these sectors. See Gutiérrez and Piton (2019) for a discussion.

Table 5: *Comparison of Several Measures of Competition, EU vs. US*

			US			EU			ΔUS vs EU
Granularity	Type	Name	97-99	13-15	Δ	97-99	13-15	Δ	(>0 implies less comp in US)
Industry	Operating Margin	OS/PROD	11.1	13.1	2.0	12.6	10.6	-1.9	3.9
		OS/VA	22.8	26.6	3.8	29.0	26.1	-2.9	6.7
		OS/K	16.7	16.2	-0.5	17.2	14.0	-3.2	2.7
	Profit & Labor shares	Profit Share (adj. for cost of D+E)	10.8	15.7	4.9	7.2	7.6	0.5	4.4
		Profit Rate (adj. for cost of D+E)	7.2	9.1	1.9	4.4	3.4	-1.1	3.0
		Labor Share	63.5	58.2	-5.3	66.3	66.7	0.5	5.8
	Investment	I/GOS	49.0	44.7	-4.3	45.6	44.6	-1.0	3.3
		Investment Gap (2015)		-0.2			0.4		0.7
Firm	Operating Margin	Pretax income/Sale	7.5	8.5	1.0	7.2	5.5	-1.7	2.7
		Aftertax Inc/Sale	4.4	5.8	1.4	4.3	3.5	-0.8	2.2
	Payouts	Payout/Assets	3.7	4.8	1.1	2.5	1.5	-0.9	2.0
	Avg Mark-up	Avg. sales mark-up (adj. for cost of D)	102.6	106.0	3.4	101.5	104.0	2.5	0.9
		Avg. sales mark-up (adj. for cost of D+E)	102.4	104.6	2.2	101.3	102.1	0.9	1.3
Concentration		Compustat	40.7	44.3	3.6	30.9	32.4	1.5	2.1
		US Economic Census	25.7	28.2	2.5				
		ORBIS (Country)				10.1	9.9	-0.2	
		ORBIS (Agg)				3.2	3.1	0.0	
		EU CompNet				34.6	33.7	-0.9	
		EU KLEMS 08 (97-06)				5.0	3.2	-1.8	

Notes: Weighted average value by measure, covering Non-Agriculture Business Sector excluding RE and Finance. See Appendix A for description of each variable and time series plots.

Figure 20: *Accounting Profitability, EU vs US*



Notes : Annual data from OECD STAN. Non-Agriculture Business sector excluding RE. EU series based on weighted average across those EU-28 countries for which data are available in STAN. Red dotted line uses the EU share of sales directly. Blue line with triangles weighted based on the US-share of sales in each industry and year to control for differences in industry mix across regions.

Profits Shares. The next set of measures consider economic profitability – namely, profit shares as defined by Barkai (2017). We improve on Barkai (2017) by using industry-level data which covers the full economy, estimating industry-level cost of equity using analyst reports; and broadening the sample to include European economies.

In particular, the profit share is calculated as follows. We assume the true model of accounting, in current dollars and for a particular country is

$$Y_t = W_t N_t + R_t^{K,tot} K_{t-1}, \tag{5}$$

$$= W_t N_t + R_t^{K,req} K_{t-1} + \Pi_t. \tag{6}$$

W_t denotes wages, N_t denotes labor, $R_t^{K,req}$ denotes a required return on capital, K_{t-1} denotes the nominal stock of capital put in place at $t-1$ and used at time t and Π_t – calculated as the remainder – denotes profits. The profit share is then given by:

$$s_t^{\Pi} = \frac{\Pi_t}{Y_t}. \tag{7}$$

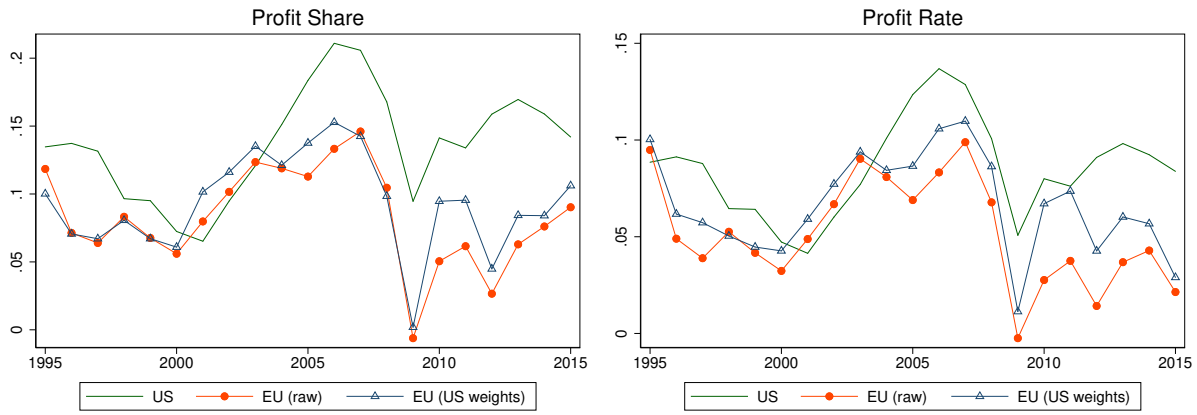
We take all measures from the data, except for $R_t^{K,req}$ which is estimated following Jorgenson (1963), but including a cost of equity:

$$R_t^{K,req} = \left(\frac{D}{D+E} i^D + \frac{E}{D+E} i^E \right) + \delta - (1-\delta)\mathbb{E}[\pi].$$

D and i^D (E and i^E) denote the stock and cost of debt (equity); $\mathbb{E}[\pi]$ the expected inflation rate of capital, and δ the depreciation rate. Each component is measured as follows:

- WN: labor compensation (LAB in EU KLEMS).
- K: current cost stock of capital from EU KLEMS (K_GFCF)
- $\frac{D}{D+E}$: ratio of total liabilities to the sum of liabilities and market-value of equity for a given country's NFC sector. We use OECD table SNA_TABLE720R. Total liabilities equal to total financial liabilities (LFLI) minus equity and investment fund shares (LF5LI). Market value of equity equal to the sum of listed plus unlisted equity (LF511LINC and LF512LINC)
- i^D: 10-year country-specific government rate (OECD table KEI, field IRLTLT01) plus the US BBB bond spread (FRED BAA - GS10)
- i^E: Estimated at the region (US vs EU) x industry-level based on analyst reports from I/B/E/S and firm financials from Compustat Global, following Claus and Thomas (2001).
- δ: weighted average of capital x industry x country depreciation rates from EU KLEMS (Deprate)
- $\mathbb{E}[\pi]$: three year lagged moving average of the growth in the industry-specific investment price index from EU KLEMS (IP_GFCF)

Figure 21: *Economic Profitability, EU vs US*



Notes : Annual data primarily from EU KLEMS 2017, covering Non-Agriculture Business sector excluding RE. EU series based on weighted average across those EU countries for which data are available in EU KLEMS. Red dotted line uses the EU share of sales directly. Blue line with triangles weighted based on the US-share of sales in each industry and year to control for differences in industry mix across regions. See text for details.

Figure 21 reports the results. The US exhibits rising profit shares, compared to stable or declining measures in Europe.[39]

Labor Share. Next, we consider the Labor Share. Figure 22 shows that the labor share for the Non-Agriculture Business sector excluding Real Estate remained stable in Europe, while it declined in the US. See Gutiérrez and Piton (2019); Cette et al. (2019) for more detailed discussions. Similar results are obtained for the NFC sector, as shown in Table 6 below.

Investment and Tobin's Q. Moving to investment, Figure 23 shows the evolution of Q for the NFC sector in Europe and the US.[40] Q should include the value of non-produced assets (mainly land) in the denominator, but this is not available for all countries. We fill-in missing values using those countries for which data are available.[41] As shown, Tobin's Q in the US is well above it's long run mean. By contrast, EU Q remains well-below the 2001 and 2007 peaks – with a value similar to those of the late 1990s and early 2000s.

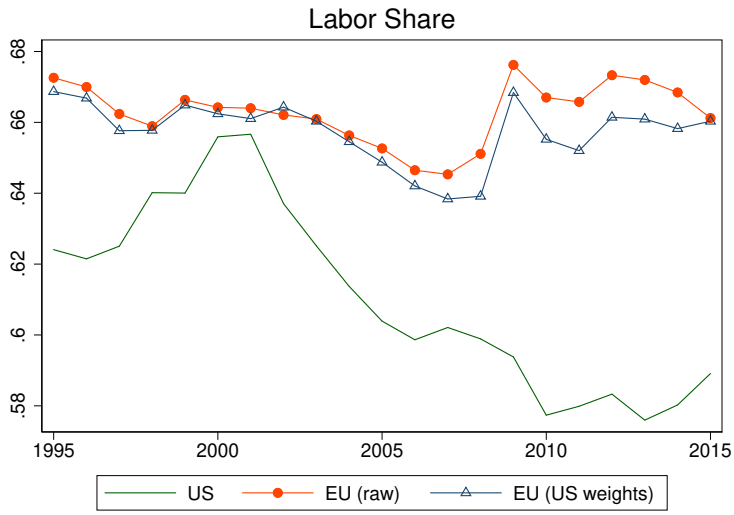
Last, Figure 24 shows that investment is in line with Q in most of Europe, yet remains below Q in the US. In particular, each plot shows the actual and predicted net investment rate for the NFC sector, where predictions are based on simple time-series regressions. We exclude Spain and Italy from the EU series given

[39] Related estimates were first reported in Gutiérrez (2017). Results differ in this paper because of differences in the industry sample, the use of a more recent KLEMS vintage (which covers the US as well as several additional countries), and small changes to the calculation (e.g., nominal instead of relative prices).

[40] EU Q is consistently lower than US Q. As pointed out by Piketty and Zucman (2014), this is due to mixture of (i) over-estimation of capital; (ii) under-estimation of equity values; and (iii) differences in control rights valuation across countries. We therefore focus on trends.

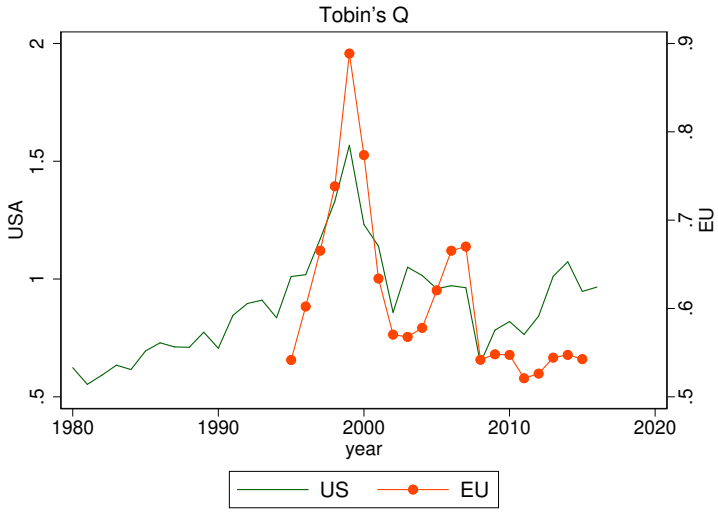
[41] In particular, if a country reports land asset values, we estimate the value of non-produced assets by applying the ratio of non-produced assets to land assets for those countries where data is available. If a country does not report land or other non-produced asset values, we estimate the value of non-produced assets based on the median ratio of produced and non-produced assets for those countries where data is available.

Figure 22: *Labor Shares, EU vs US*



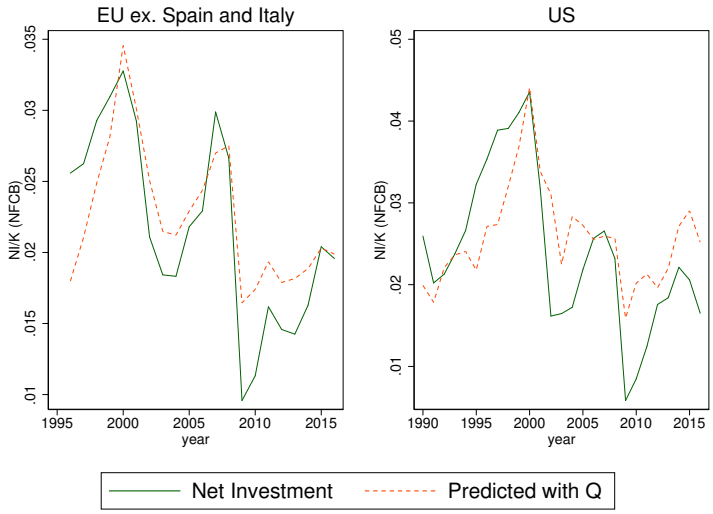
Notes : Annual data primarily from EU KLEMS 2017, covering Non-Agriculture Business sector excluding RE. EU series based on weighted average across those EU countries for which data are available in EU KLEMS. Red dotted line uses the EU share of sales directly. Blue line with triangles weighted based on the US-share of sales in each industry and year to control for differences in industry mix across regions.

Figure 23: *Q for US and Europe*



Notes: Data from OECD, including all countries for which NFC data was available (AUT, BEL, CZE, DEU, ITA, ESP, EST, FIN, FRA, HUN, LTU, LUX, LVA, NLD, SWE, USA). See Dottling et al. (2017) for details on dataset construction.

Figure 24: *NFC NI/K vs. Q, EU ex. Spain and Italy and US*



Notes: Figure shows the actual and predicted net investment rate by for Non-Financial Corporate sector. Predicted series based on a simple time-series regression of net investment on lagged Q from 1996 to 2009 for Europe and 1990 to 2001 for the US. See Dottling et al. (2017) for variable definitions and more detailed analyses that confirm this conclusion.

the continued effect of the sovereign crisis (investment in these countries remains well-below Q, likely due to financial constraints).

Figure 25 replicates the exercise using country x industry data from OECD STAN. Namely, we plot the year fixed effects from separate regressions across EU28 countries and the US:

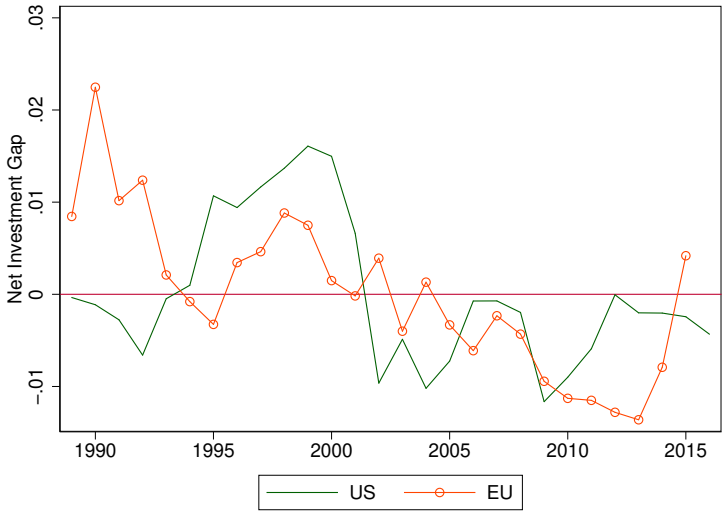
$$\frac{NI_{jct}}{K_{jct-1}} = \beta_1 \bar{Q}_{jct-1} + \beta_2 \frac{K^{int}_{jct-1}}{K^{tot}_{jct-1}} + \gamma_{cj} + \alpha_t$$

where $\bar{Q}_{jct-1}$ denotes the mean Q across all Compustat firms in country c, industry j. We control for the share of intangible capital as discussed in Gutiérrez and Philippon (2017b); Crouzet and Eberly (2018b), and include country x industry fixed effects. Again, we find no persistent investment gap in the EU, compared to a persistent investment gap in the US. See Gutiérrez and Philippon (2017b) for a more detailed discussion of the evolution of investment in the US, and Dottling et al. (2017) for a comparison of the EU and the US.

Firm-level Profit Margins. Moving from national account to firm-level data, Figure 26 shows that profitability of US firms increased while it remained stable in Europe. In particular, we plot the weighted average pre- and post-tax profit rates across all firms in Compustat, excluding the Real Estate sector (Compustat items PI/SALE and IB/SALE, respectively). We use measures of total income because the composition of operating and non-operating income differs widely across regions.

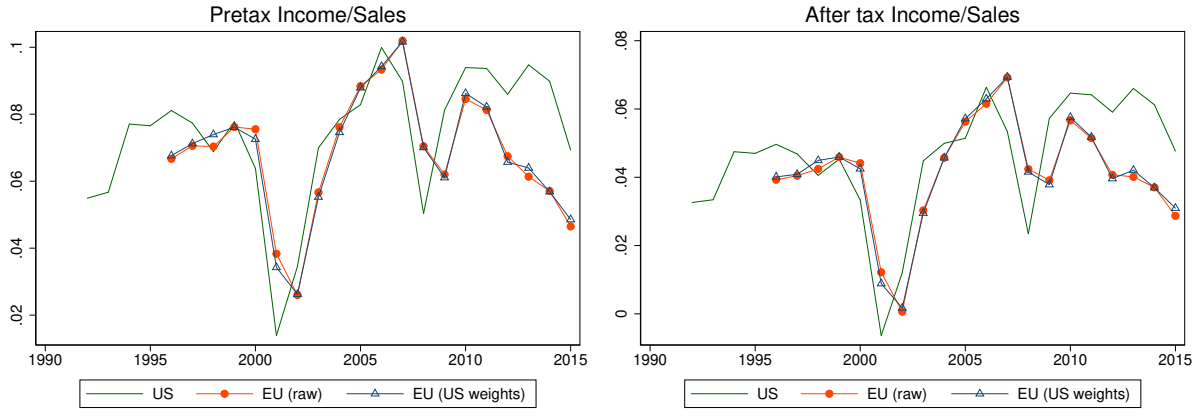
Firm-level Average Mark-ups. Let us now study average firm-level mark-ups. We apply the methodology of Caballero et al. (2017b) to firm-level data. In particular, we solve equation (1) in Caballero et al. (2017b) for the mark-up of firm i in industry j, μ_{ij} :

Figure 25: *Industry-level NI/K vs. Q, EU vs US*



Notes: See text for details. Investment from OECD STAN. Tobin's Q from Compustat.

Figure 26: *Firm-level Accounting Profitability, EU vs US*



Notes: Annual data from Compustat. See text for details.

$$APK^e_{ik} = r^s + KRP_j + \frac{Y_{ik}}{\zeta_j K_{ik}} \left(1 - \frac{1}{\mu_{ij}}\right) - (1 - \delta_{ij}) g^e_{\zeta,ij}, \tag{8}$$

where we assume that all expected quantities are equal to the realized ones and can therefore be taken the data:

- APK^e_i denotes the expected average product of capital for firm i. This is measured as the ratio of operating surplus to lagged capital, where
  - Operating Surplus = operating income after depreciation minus income taxes (OIADP - TXT)
  - Capital equals PP&E plus intangibles (items PPENT + INTAN)
- $r^K_j = r^s + KRP_j$ denotes the required return on capital for industry j. We assume that capital is funded using a mix of equity and bonds that is constant for all firms in a region x industry. Thus, the required return is:

$$r^K_j = \frac{D_j}{D_j + E_j} (r_{10} + US\,BBB\,spread) + \left(1 - \frac{D_j}{D_j + E_j}\right) (r_{10} + ERP_j)$$

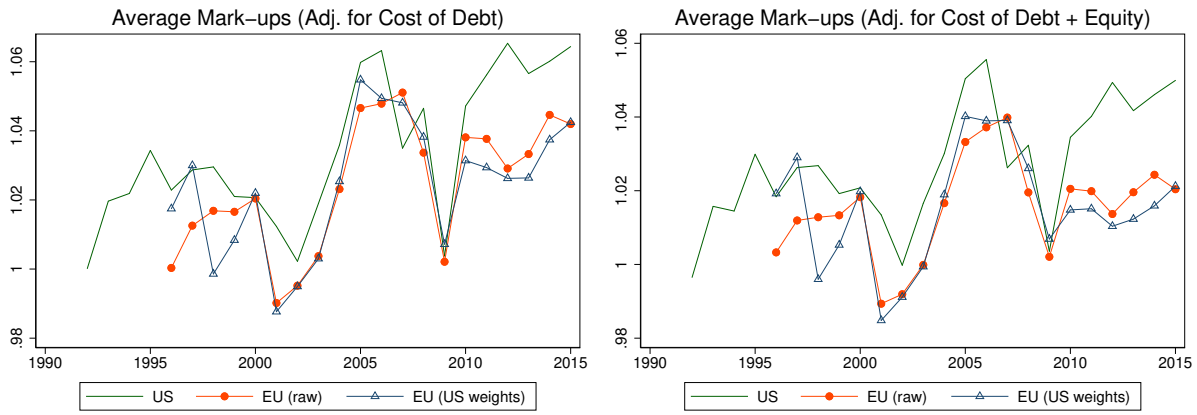
  - $\frac{D_j}{D_j + E_j}$ is set equal to the weighted average debt-to-equity ratio for all firms in a given region (US vs EU) x industry.
  - r_{10}, BBB spread and ERP are the same as those used for profit shares above.
- $\frac{Y_i}{\zeta K_i}$ denotes the ratio of output to current-cost capital. This is set equal to Compustat item SALE over the corresponding measure of capital
- μ_i denotes the mark-up to be solved for
- δ_j denotes the depreciation rate, which is based on industry-level BEA figures for the US and EU KLEMS for Europe
- $g^e_{\zeta,j}$ denotes the expected growth rate in the relative price of investment of industry j, set equal to the actual growth in the corresponding year

APK^e_i, $\frac{Y_i}{\zeta K_i}$ and the resulting markups are winsorized at the 1st and 99th percentile by year.

Figure 27 reports the results. When adjusting only for the cost of debt, profits appear to increase in both regions. However, controlling for rising equity premia – as emphasized by Gutiérrez (2017) – estimated mark-ups remain largely stable in Europe yet increase in the US.

Concentration. Last, we present a variety of robustness tests for concentration measures. A concern may be that our results are unique to our ORBIS and/or Compustat sample. However, the same conclusions are reached using alternate data sources and a broader sample of countries, as summarized in Table 5. Figure 28 shows the weighted average HHI for Europe from four alternate sources and populations: KLEMS 2008, Compustat, the ECB's CompNET and ORBIS. The differences in levels are due to differences in the

Figure 27: *Firm-level Economic Profitability, EU vs US*



Notes: Annual data primarily from Compustat. See text for details.

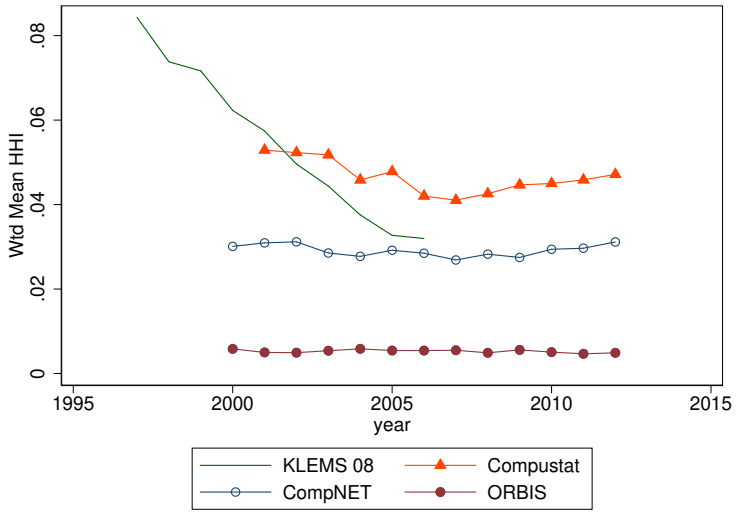
treatment of consolidated entities, granularity of segments and country/industry coverage.[42] Still, the trends are largely consistent. Figure 29 shows the corresponding time series by sector, where available.

Figures 30 and 31 show similar conclusions for the US using Compustat and the US Census. Again, the levels differ due to differences in segmentation but the trends are very consistent across sources. See also Autor et al. (2017a) for a longer time-series of US census-based concentration measures under a consistent segmentation, which exhibit similar trends: concentration begins to increase from 1992 and 1997 for Retail Trade and Services, and between 1997 and 2002 for the remaining sectors.

To conclude, table 6 replicates the results of table 5 for the Non-financial Corporate and the Corporate sectors. The approach and conclusions are largely the same. Data is primarily sourced from the OECD, but it is complemented with data from the Bank of Italy and the Bank of Spain when missing.

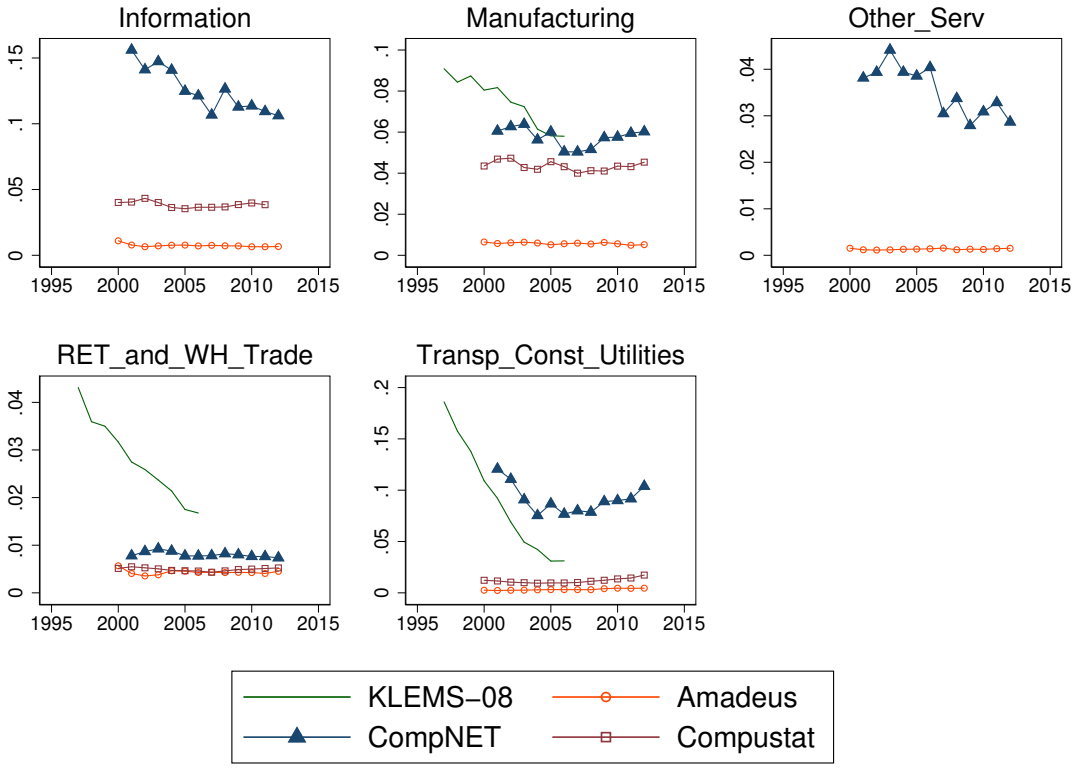
[42] KLEMS 2008 uses the most granular segments (a mixture of ISIC Level 2 and 3) and therefore yields higher concentration measures. It is followed by Compustat (EU KLEMS segments with consolidated accounts, adjusted for coverage), CompNET (mostly ISIC Level 2, based on country-level consolidated statements for non-financial corporations), and ORBIS (EU KLEMS segments with unconsolidated accounts).

Figure 28: *Weighted Average EU Herfindahl across Four Sources*



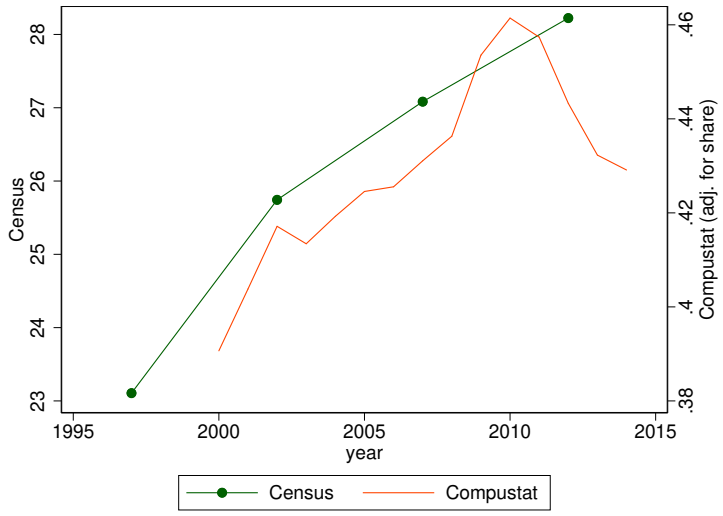
Note: Annual data from KLEMS 2008, ORBIS, Compustat Global and the ECBs CompNET. We report the weighted average HHI across all countries and industries reported in each database. Similar conclusions reached using the median and simple mean, as well as using concentration ratios (available only for CompNET, ORBIS and Compustat).

Figure 29: *Weighted Average EU Herfindahl across Four Sources, by Sector*



Note: Annual data from KLEMS 2008, ORBIS, Compustat Global and the ECBs CompNET. We report the weighted average HHI across all countries and industries reported in each database. Similar conclusions reached using the median and simple mean, as well as using concentration ratios (available only for CompNET, ORBIS and Compustat).

Figure 30: *Weighted Average 8-firm CR for the US: Compustat vs. US Census*

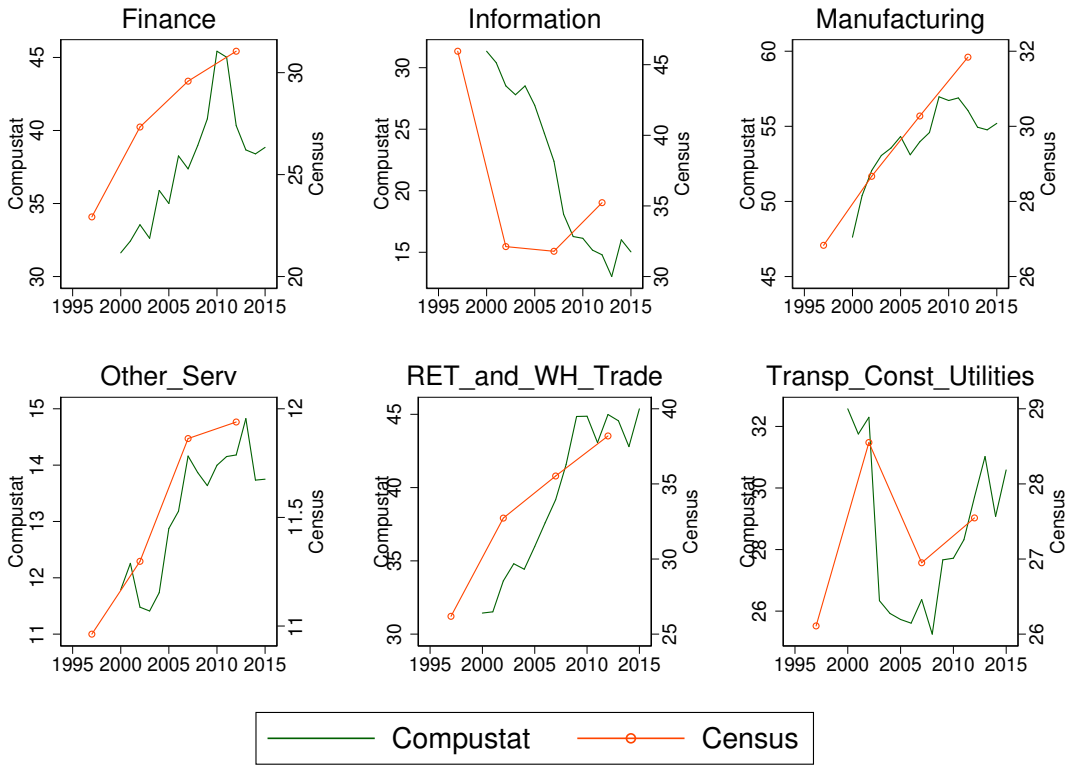


Note: Annual data from Compustat and US Economic Census. Compustat series based on the weighted average CR-4 across EU KLEMS industries (by sales). Census series based on the weighted average of NAICS-3 CRs which appear consistently from 1997 to 2012 (i.e., we exclude industries that experience major revisions either to the NAICS hierarchy or the reporting structure in the Economic Census).

Table 6: *Comparison of Several Measures of Competition, EU vs. US, Corporate and NFC Sectors*

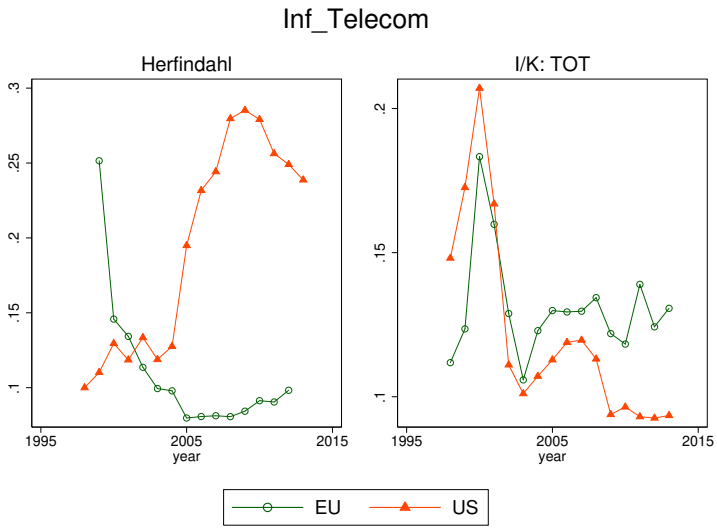
			US			EU			ΔUS vs EU (>0 implies less comp in US)
Granularity	Type	Name	97-99	13-15	Δ	97-99	13-15	Δ	
NFCB	Operating Margin	OS/VA	15.5	18.9	3.4	23.0	20.6	-2.4	5.8
		OS/K	10.0	10.1	0.1	10.7	9.1	-1.6	1.7
	Profit & Labor shares	Profit Share (adj. for cost of D+E)	2.4	10.1	7.7	6.4	7.3	0.9	6.8
		Profit Rate (adj. for cost of D+E)	-0.1	3.8	3.9	2.8	3.0	0.3	3.6
		Labor Share	68.9	63.1	-5.8	60.1	60.8	0.7	6.5
	Investment	NI/NOS	37.6	19.7	-17.9	26.0	14.7	-11.3	6.6
		Investment Gap (2015)		-0.8			0.0		0.9
CB	Operating Margin	OS/VA	16.4	20.3	4.0	23.4	21.7	-1.7	5.7
		OS/K	10.7	11.3	0.6	9.4	8.6	-0.8	1.5
	Profit & Labor shares	Profit Share (adj. for cost of D+E)	3.6	13.5	9.9	4.5	9.2	4.7	5.2
		Profit Rate (adj. for cost of D+E)	0.7	5.8	5.1	1.6	3.4	1.8	3.3
		Labor Share	68.0	61.8	-6.1	60.0	60.2	0.2	6.3
	Investment	NI/NOS	37.0	17.4	-19.5	24.7	13.1	-11.6	7.9

Figure 31: *Weighted Average 8-firm CR for the US, by Sector: Compustat vs. US Census*



Note: Annual data from Compustat and US Economic Census. Compustat series based on the weighted average CR-8 (by sales) across EU KLEMS industries that belong to each sector. Census series based on the weighted average of NAICS-3 CRs which appear consistently from 1997 to 2012 and belong to each sector. NAICS-3 industries mapped to KLEMS sectors using the NAICS 2007 to ISIC Rev. 4 Concordance available at link.

Figure 32: *EU vs US: Telecom*



Notes: Chart compares the evolution of the Herfindahl and investment rate in the Telecom industry for the US and Europe. European series are based on the weighted average across major EU economies. See Gutiérrez and Philippon (2017a) for details.

B Appendix for Section 1.2: Prices

This section presents additional results relating to our measures of prices and mark-ups.

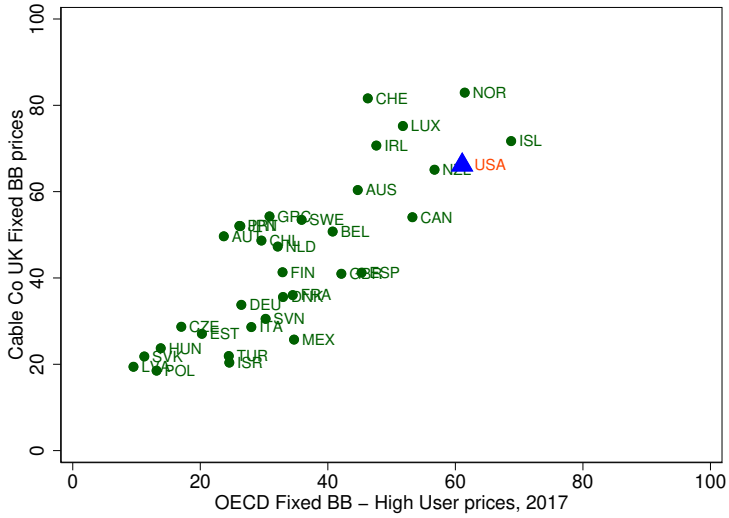
B.1 Telecom

Figure 32 contrasts the evolution of concentration and investment in the Telecom Industry, between the US and Europe. Figure 33 validates the OECD's broadband price indices by comparing them against an alternate source (Cable.co.uk). While creating such price indices is difficult due to the nuances of broadband offerings across regions (e.g., roaming charges, caps, etc.), the two series yield similar conclusions. In particular, the US exhibits one of the highest prices according to both sources.

B.2 Country-level

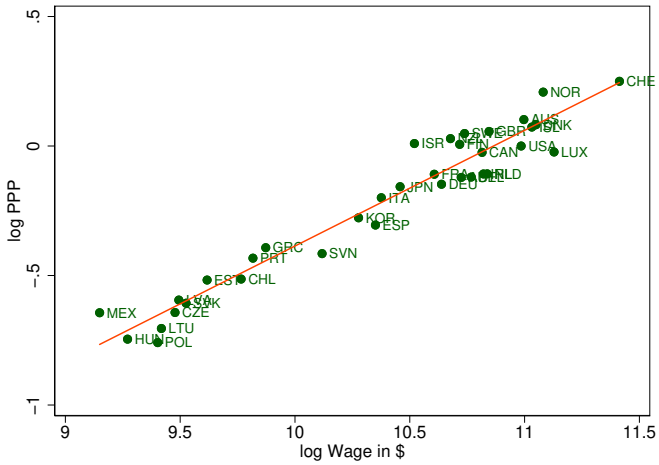
Figure 34 shows that PPP increases with wages, and the relationship is quite linear, consistent with Balassa (1964). Figure 35 shows the evolution of relative country-level mark-ups by country. Italy exhibits the lowest drop of mark-ups while Germany and France have the highest. Figure 36 plots the complete panel dataset underlying our regressions.

Figure 33: *Two alternate sources of Telecom prices*



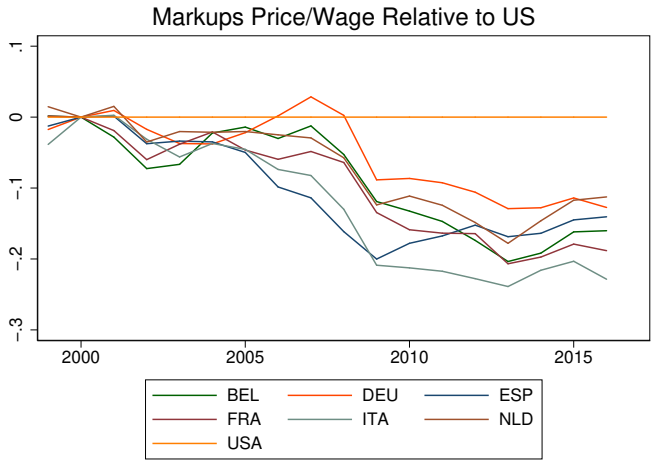
Notes: Chart compares the fixed broadband prices reported by Cable Co UK and the OECD.

Figure 34: *Prices vs. Wages*



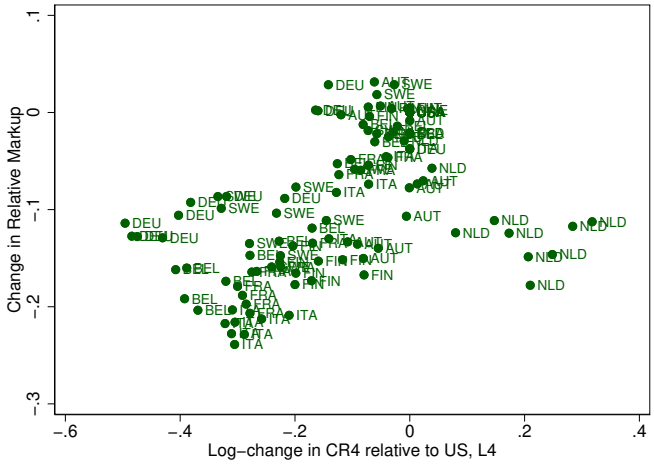
Source: ICP data for prices, OECD for wages. See text for details.

Figure 35: *Relative Mark-ups by Country*



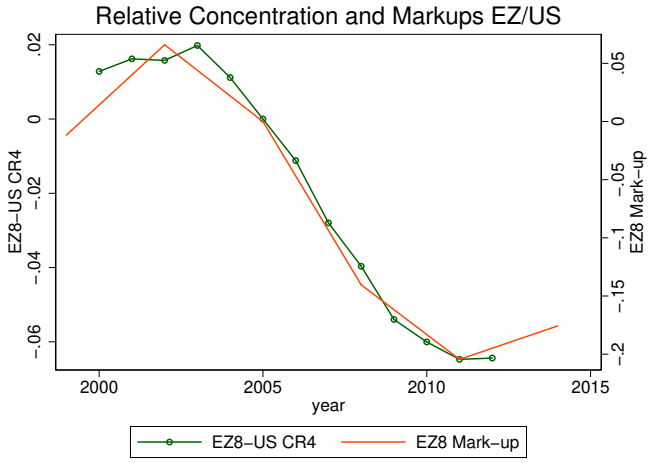
Notes: ICP data for prices, OECD data for wages and productivity. See text for details.

Figure 36: *Relative Mark-ups and Concentration, Country-level Panel*



Source: ICP for prices, OECD for wages and productivity, ORBIS and Compustat for concentration. See text for details. Relative increase in concentration in NLD entirely due to Construction. Results robust to excluding this industry.

Figure 37: *Relative Mark-ups and Concentration, EU vs US at Product-level*



Sources: ICP Benchmark studies for product-level prices. Compustat for US concentration. BvD Orbis for EU concentration.

B.3 Country x Product-level: ICP

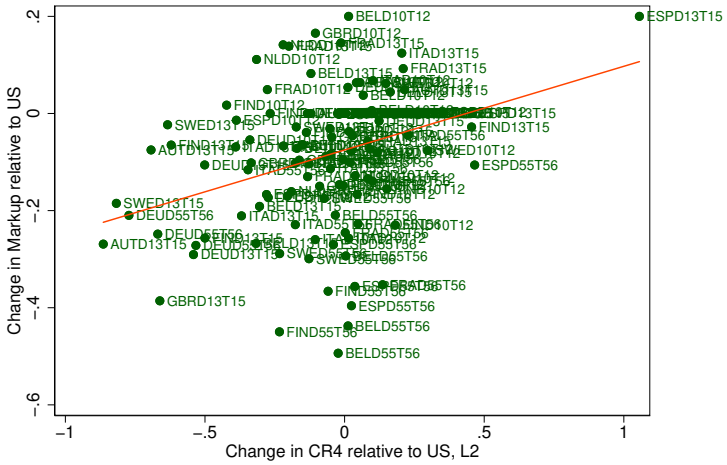
Figure 37 replicates Figure 6 but including only the products that could be mapped to industries. Consistent with the aggregate data, prices declined with concentration. Figure 38 plots the complete panel dataset underlying our product-level regressions.

B.4 Country x Industry-level: KLEMS

Figure 39 contrasts the evolution of mark-ups, prices, unit labor costs, labor productivity and wages per-hour. The US exhibits one of the lowest increases in unit labor costs, driven by substantially faster labor productivity growth, offset by slightly faster wage growth. Despite the slower labor cost growth, US prices exhibit the largest increase among major economies. Combined, this implies large relative mark-up growth. We acknowledge that the rank-ordering of mark-ups using producer prices differs from that of PPP data (rank-ordering is more consistent when normalizing as of 2005), but the conclusions remain.

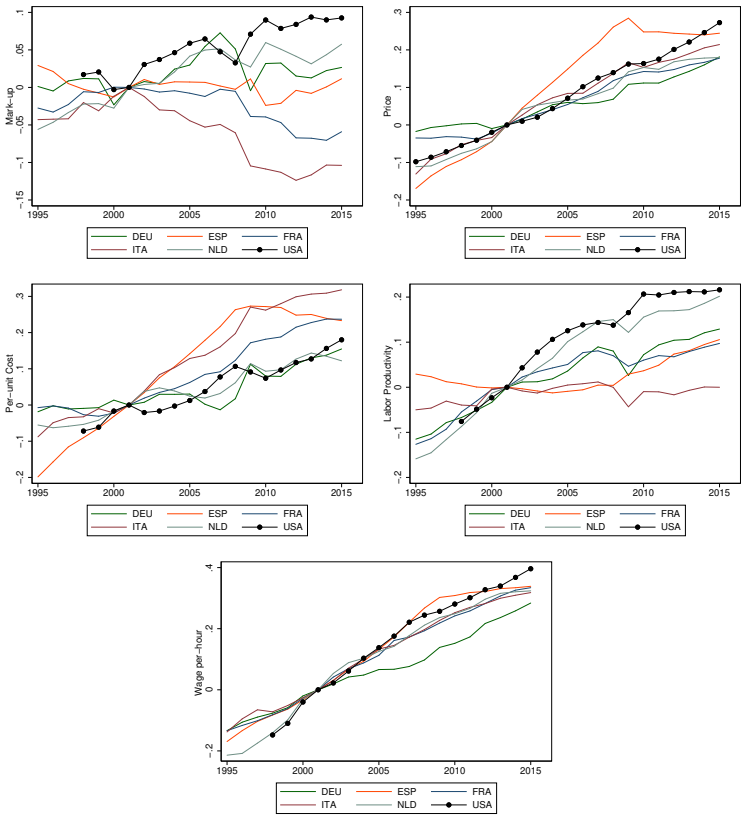
Figure 40 studies the relationship between prices, productivity and concentration for the US by providing bin-scatter plots. The left plot shows that prices decline with productivity, as expected. The middle plot shows that TFP declines with changes in concentration. This contrasts with the results of Autor et al. (2017b) and Ganapati (2018). The source of the difference is the time period. We focus on the last 20 years over which, as first documented in Gutiérrez and Philippon (2017a), the relationship between concentration and productivity reversed signs. The last plot shows that – over the recent period – concentration is also correlated with rising prices. Covarrubias et al. (2019) further validate this conclusion using granular industry segments and prices from the BEA. Figure 41 replicates Figure 40 for EU countries. Rising concentration still appears to be benign in the EU. It is related to increasing productivity and stable prices.

Figure 38: *Relative Mark-ups and Concentration, Country x Product-level Panel*



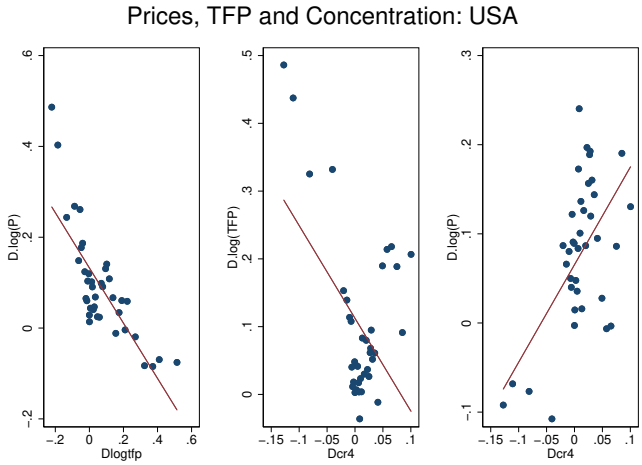
Source: ICP Benchmark studies for product-level prices. Compustat for US concentration. BvD Orbis for EU concentration.

Figure 39: *Decomposition of Mark-up Increase*



Notes: plots show the weighted average change in the corresponding quantity across non-agriculture business industries for each country. Data from EU KLEMS 2017. See text for details.

Figure 40: *Prices, Productivity and Concentration, US*



Notes: Bin-scatter plot of cumulative changes prices, TFP and concentration since 2001. Data from EU KLEMS 2017. Omits outlier industries described in the text.

C Appendix for Section 2: Model

C.1 Lobbying Shock

There has been a large increase in corporate lobbying and campaign finance expenditures in the US. Formally, we can think of an unanticipated shock to the parameter γ. The choice of θ can then have larger consequences than expected. Let us compare the increase in markups from positive shock to γ in the one country model vs the supra-national model:

$$\bar{\mu}(\gamma) = \gamma\beta \rightarrow \frac{\partial \bar{\mu}(\gamma)}{\partial \gamma} = \beta \qquad \text{One-country}$$

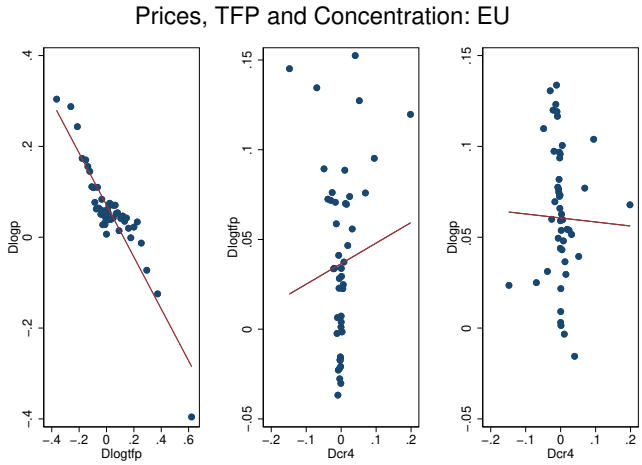
$$\mu^s(\gamma) = \frac{\theta^s/2 + \theta^s\gamma}{1 - \theta^s/2} \rightarrow \frac{\partial \mu^s(\gamma)}{\partial \gamma} = \frac{\theta^s}{1 - \theta^s/2} \qquad \text{Supranational}$$

Lemma 3. *An unexpected increase in γ in period 2 generates a larger increase in markups in the one country model than in the model with a supra-national regulator:*

$$\beta > \frac{\theta^s}{1 - \theta^s/2}$$

Proof. From proposition 1, we know that markups are higher in the one country model: $\beta\gamma > \frac{\theta^s/2 + \theta^s\gamma}{1-\theta^s/2}$.

Figure 41: *Prices, Productivity and Concentration, EU*



Source: Bin-scatter plot of cumulative changes prices, TFP and concentration since 2001. Data from EU KLEMS 2017. See text for details.

Then, we have:

$$\beta\gamma > \frac{\theta^s/2 + \theta^s\gamma}{1 - \theta^s/2} > \frac{\theta^s\gamma}{1 - \theta^s/2}$$

Dividing by γ, we get $\beta > \frac{\theta^s}{1-\theta^s/2}$. □

C.2 General Utility

As in the logarithmic case, since firms in industry i cannot set a markup higher than μ_i, firms choose the maximum price $p_i = (1 + \mu_i)\, w/z_i$. Given prices and wages, household maximize

$$U = \max \sum_{i=1}^{2} u(x_i) - n$$
$$s.t. \sum_{i=1}^{2} p_i x_i = wn + \sum_{i=1}^{2} \Pi_i^{\$}$$

where $\Pi_i^{\$}$ are nominal profits from industry i. Let λ be the Lagrange multiplier on the budget constraint. We have $u'(x_i) = \lambda p_i$ and $1 = \lambda w$. Using the equation for price, we then get $u'(x_i) = 1 + \mu_i$. So there is simple direct mapping between the markups and the quantities produced in equilibrium. We can therefore think of the regulator as indirectly choosing the quantities $\{x_i\}_{i=1,2}$. This leads to the indirect utility function for the households

$$U(\{x_i\}_i) = \sum_{i=1}^{2} u(x_i) - x_i/z_i$$

Real Profits (nominal profits divided by wage) are

$$\Pi_i \equiv x_i p_i/w - x_i/z_i = \mu(x_i)\, x_i/z_i$$

Note that

$$\frac{\partial \Pi}{\partial x_i}(x^\star) < 0$$

This is simply because $\mu(x^\star) = 0$ and $\frac{\partial \mu(x_i)}{\partial x_i} < 0$. We assume for convenience that $\frac{\partial \pi}{\partial x_i} < 0$ for the relevant range of values.[43]

Welfare and Capture Ex-Post With general utility, the problem of the regulator is:

$$\max_{\{x_i\}} U(\{x_i\}_i) + \theta\gamma\Pi_\epsilon$$

Let us define x^ϵ as the solution to

$$u'(x^\epsilon) \equiv 1/z_i - \theta\gamma\Pi'(x^\epsilon)$$

Lemma 4. *The equilibrium under regulation is*

$$x_i(i = \epsilon) = x^\epsilon$$
$$x_i(i \neq \epsilon) = x^\star$$

where $x^\epsilon < x^\star$. The indirect utility is

$$U(\epsilon, \theta) = \bar{U}(\theta) = u(x^\star) - x^\star/z_{\epsilon \neq i} + u(x^\epsilon) - x^\epsilon/z_{\epsilon = i}$$

and profits are positive if $\epsilon = i$ and zero otherwise.

Proof. The regulator sets markup limits to maximize

$$\sum_{i=1}^{2} u(x_i) - x_i/z_i + \theta\gamma\Pi(x_{i=\epsilon})$$

The first order conditions are then

$$u'(x_i) = 1/z_i - \theta\gamma\Pi'(x_i)\, 1_{i=\epsilon}$$

and $x^\epsilon < x^\star$ since $\pi'(x^\star) < 0$. □

Note that, because of symmetry, $U(\epsilon, \theta)$ does not actually depend on whether $\epsilon = 1$ or $\epsilon = 2$.

Ex-ante Design of Regulatory Independence. This part of the problem is unaffected by the specification of the utility function and in particular we still have that politicians at design stage would set $\theta = \beta$ where β captures the bias of the politician.

[43] For instance, if $u \equiv \log$, then $x^\star = 1$ and $\pi_i(x_i) = 1 - x_i$.

Supra-national Regulatory Design. Now we extend our model to two countries with specialized production. Again, by law of one price and balance of trade, we have that $w_i = w_j$ and $x_{ij} = x_{ii} = x_i$. By market clearing, we have that $z_i n_i = x_{ij} + x_{ji} = 2x_i$, so

$$n_i = \frac{2x_i}{z_i}$$

Then, we can write the indirect utility of consumers in country i as

$$U_i(\{x_i\}_i) = u(x_i) + u(x_j) - \left(\frac{2x_i}{z_i}\right)^{1/\alpha}$$

Lets call profits under the supra-national regulator Π^s. Real profits of the firm are

$$\Pi_i^s(\mu) = 2\mu(x_i)x_i/z_i$$

Thus, compared with profits in the one country model, we have $\Pi^s = 2\Pi$. The objective of the regulator is

$$\begin{aligned}\mathcal{R} &= \max_{\{x_i\}} U_{i=\epsilon} + (1-\theta)U_{i\neq\epsilon} + \theta\gamma\Pi^s_{i=\epsilon} \\ &= \max (2-\theta)u(x_{i=\epsilon}) + (2-\theta)u(x_{i\neq\epsilon}) - \frac{2x_{i=\epsilon}}{z_{i=\epsilon}} - (1-\theta)\frac{2x_{i\neq\epsilon}}{z_{i\neq\epsilon}} + \theta\gamma\Pi^s_{i=\epsilon}\end{aligned}$$

The first order condition for $x_{i=\epsilon}$ is:

$$(2-\theta)u'(x_{i=\epsilon}) = 2/z_{i=\epsilon} + \theta\gamma\Pi'^s(x_{i=\epsilon}) = 2[1/z_{i=\epsilon} + \theta\gamma\Pi'(x_{i=\epsilon})]$$

In order to compare to the first order condition in the one country model, Lets call the solution to this equation $x^s_{i=\epsilon}$ and the solution in the one country model $\bar{x}_{i=\epsilon}$. For the one country model, we had $u'(\bar{x}_i) = 1/z_i - \theta\gamma\Pi'(\bar{x})\,1_{\epsilon=i}$. Then, we have that $u'(x^s_{i=\epsilon}) = \frac{2}{2-\theta}u'(\bar{x}_{i=\epsilon})$, which implies that $x^s_{i=\epsilon} < \bar{x}_{i=\epsilon}$ as in the case with logarithmic preferences.

For $x_{i\neq\epsilon}$, the first order condition is

$$(2-\theta)u'(x_{i\neq\epsilon}) = 2(1-\theta)/z_{i\neq\epsilon}$$

Again, comparing the first order condition its easy to see that $x^s_{i\neq\epsilon} > \bar{x}_{i\neq\epsilon}$, so we have that with general utility the problem of the supra-national regulator has the same distortions with respect to the one-country problem than in the logarithmic case.

C.3 Decreasing Returns

We consider the case where the production function is

$$x_i = z_i n_i^{\alpha}$$

Now the real profits of the firm are $\Pi_i \equiv \pi(x_i) = x_i p_i/w - (x_i/z_i)^{1/\alpha}$. Thus, calculating the marginal cost and using the definition of markups we get

$$p_i = \frac{1+\mu_i}{z_i}\frac{w}{\alpha}\left(\frac{x_i}{z_i}\right)^{\frac{1-\alpha}{\alpha}}$$

The consumption problem is the same as before, so $w/p_i = x_i$. Replacing and solving for x_i we get

$$x_i = \alpha^\alpha \frac{z_i}{1+\mu_i}$$

Thus, the regulator is indirectly choosing x_i, and the welfare maximizing quantity is $x^* = \alpha^\alpha z_i$.

Welfare and capture ex-post. The politicians maximize $V(\epsilon) = U + \gamma\Pi_\epsilon$. Since they have influence θ over the regulator, the regulator maximizes

$$\mathcal{R} = \max_{\{x_i\}} (1-\theta) U + \theta V(\epsilon) = U(\{x_i\}_i) + \gamma\theta\Pi_\epsilon$$

With $x_i = z_i n_i^\alpha$ we have that indirect utility is

$$U(\{x_i\}_i) = \sum_{i=1}^{2} \log(x_i) - \left(\frac{x_i}{z_i}\right)^{1/\alpha}$$

and using $w/p_i = x_i$ again, real profits can be written as

$$\Pi_i = 1 - \left(\frac{x_i}{z_i}\right)^{1/\alpha}$$

Thus, the problem of the regulator is to maximize

$$\sum_{i=1}^{2} \log(x_i) - \left(\frac{x_i}{z_i}\right)^{1/\alpha} + 1_{\epsilon=i}\theta\gamma\left(1 - \left(\frac{x_i}{z_i}\right)^{1/\alpha}\right)$$

The solution to this problem is $x_{\epsilon\neq i} = x^* = \alpha^\alpha z_i$ and $x_{\epsilon=i} = \left(\frac{\alpha}{1+\theta\gamma}\right)^\alpha z_i$. Again, we measure the deviation from ex-post consumer surplus maximization by the variable m defined as the ration of output to efficient output:

$$m_i \equiv \frac{x_i}{x_i^*},$$

Using $x_i^* = \alpha^\alpha z_i$, the solution of the regulator is $\bar{m} = x_{i=\epsilon}/x^* = \frac{1}{1+\theta\gamma}$ and $\overline{M} = x_{i\neq\epsilon}/x^* = 1$, the same as in the baseline case of constant return to scale.

Ex-ante Design of Regulatory Independence. This problem is unaffected by the production function and in particular we still have that politicians at the design stage would set $\theta = \beta$ where β captures the bias of the politician.

Supra-national Regulatory Design. Now we extend our model to two countries with specialized produc-

tion. Again, by law of one price and balance of trade, we have that $w_i = w_j$ and $x_{ij} = x_{ii} = x_i$. By market clearing, we have that $z_i n_i^\alpha = x_{ij} + x_{ji} = 2x_i$, so

$$n_i = \left(\frac{2x_i}{z_i}\right)^{1/\alpha}$$

Then, we can write the indirect utility of consumers in country i as

$$U_i(\{x_i\}_i) = \log(x_i) + log(x_j) - \left(\frac{2x_i}{z_i}\right)^{1/\alpha}$$

and, using $w/p_i = x_i$, real profits of the firm are

$$\Pi_i = 2 - \left(\frac{2x_i}{z_i}\right)^{1/\alpha}$$

Plugging-in in the objective of the regulator, we have

$$\begin{aligned}
\mathcal{R} &= \max_{\{x_i\}} U_{i=\epsilon} + (1-\theta)U_{i\neq\epsilon} + \theta\gamma\Pi_{i=\epsilon} \\
&= \max (2-\theta)log(x_{i=\epsilon}) + (2-\theta)log(x_{i\neq\epsilon}) - (1+\theta\gamma)\left(\frac{2x_{i=\epsilon}}{z_{i=\epsilon}}\right)^{1/\alpha} + (1-\theta)\left(\frac{2x_{i\neq\epsilon}}{z_{i\neq\epsilon}}\right)^{1/\alpha} + 2\theta\gamma
\end{aligned}$$

We are going to use the under-script dr to denote the solution to this problem with decreasing return to scale. The solution is

$$\begin{aligned}
\frac{x_{i=\epsilon}}{\alpha^\alpha z_{i=\epsilon}} &\equiv m^s_{dr}(\theta;\gamma) = \frac{1}{2}\left[\frac{(2-\theta)}{1+\theta\gamma}\right]^\alpha = 2^{\alpha-1}(m^s)^\alpha < \overline{m} \\
\frac{x_{i\neq\epsilon}}{\alpha^\alpha z_{i\neq\epsilon}} &\equiv M^s_{dr}(\theta;\gamma) = \frac{1}{2}\left[\frac{(2-\theta)}{1-\theta}\right]^\alpha = 2^{\alpha-1}(M^s)^\alpha > 1
\end{aligned}$$

With decreasing returns to scale, we have that the supra-national regulator still gives lower profits to the foreign firm but not necessarily to the extent that profits become negative. Real profits for the foreign country are

$$\Pi_{i\neq\epsilon} = 2 - \frac{\alpha(2-\theta)}{1-\theta}$$

Thus, profits of foreign firms will be positive if returns to scale are decreasing enough ($\alpha < \frac{2-2\theta}{2-\theta}$). Beside this, we can see that decreasing return to scale do not alter significantly the interpretation of the model.
At this stage, we can calculate ex-post utilities. Using $m = x/x^*$ and $n = 2^{1/\alpha}\alpha m^{1/\alpha}$, we can write ex-post utilities as:

$$\begin{aligned}
U_{i=\epsilon} &= U^* + \log\left(m^s_{dr}\right) + \log\left(M^s_{dr}\right) + 2^{1/\alpha}\alpha\left(1 - (m^s_{dr})^{1/\alpha}\right) \\
U_{i\neq\epsilon} &= U^* + \log\left(m^s_{dr}\right) + \log\left(M^s_{dr}\right) + 2^{1/\alpha}\alpha\left(1 - (M^s_{dr})^{1/\alpha}\right)
\end{aligned}$$

Ex-Ante Design of Regulatory Independence The ex-ante utility of policy designers from country i is

$$W^s(\theta) = \mathbb{E}\left[(1-\beta)U_i + \beta V_i\right] = \mathbb{E}\left[U_i + \beta\gamma\Pi_i\right]$$
$$= U^* + \log\left(m^s_{dr}\right) + \log\left(M^s_{dr}\right) - 2^{\frac{1-\alpha}{\alpha}}\alpha\left(1+\beta\gamma\right)\left(\left(m^s_{dr}\right)^{1/\alpha} + \left(M^s_{dr}\right)^{1/\alpha}\right) + constants$$

We can write the ex-ante utility in terms of m^s and M^s instead of m^s_{dr} and M^s_{dr} in order to compare the solution to this new problem to the baseline case. Using $m^s_{dr} = 2^{\alpha-1}(m^s)^\alpha$ and $M^s_{dr} = 2^{\alpha-1}(M^s)^\alpha$, we get

$$W^s(\theta) = \mathbb{E}\left[(1-\beta)U_i + \beta V_i\right] = \mathbb{E}\left[U_i + \beta\gamma\Pi_i\right]$$
$$= U^* + \alpha\log\left(m^s\right) + \alpha\log\left(M^s\right) - \alpha\left(1+\beta\gamma\right)\left(m^s + M^s\right) + constants$$

This problem is the same that the one we had with constant return to scale but with an α multiplying all the terms that are relevant for the first order condition and with a different constant. Thus, the chosen θ is not affected by decreasing returns to scale.

C.4 Externality

In the main text we assume that the designers are politicians, and as such they are biased. We can also consider an externality to create a meaningful tension between the first best and the decentralized equilibrium under perfect competition. We assume that aggregate welfare is the sum of households' direct utility from consumption and leisure plus a term that increases with industry profits

$$W = U + \alpha\Pi_\eta$$

where $\eta = 1, 2$ with equal probability. The term $\alpha\Pi_\eta$ can have several interpretations, from innovation, increasing returns, and financial distress to political economy. For instance, it is similar to that in Lim and Yurukoglu (2018).[44] Without this externality, it would be trivially optimal to delegate control to a completely independent regulator tasked with enforcing perfect competition. With the externality, on the other hand, there is room for a politician to make a legitimate case for protecting an industry. We introduce randomness (via η) to create value for flexibility, i.e., it is not known in advance which industry really needs some (temporary) protection. Of course, politicians have their own agendas and full flexibility is not optimal either. We define

[44] There are several ways to motivate this externality. One is a model of financial distress and inefficient liquidation, where it can be optimal to help an industry, for instance during a financial crisis. Another is a model with incentives to innovate or to invest. Lim and Yurukoglu (2018) study a dynamic investment game between an electricity firm and a regulator subject to time consistency issues, where the regulator puts a weight on customer surplus and a weight on the firm's profits. There is also a political economy interpretation. A government implementing difficult reforms needs to pick its fights carefully. For instance, in France, the national railway company arguably suffers from excessive prices (and wages) but also from excessive pension obligations. It may be too risky to implement the pension reform and the deregulation of services at the same time, however. The exact nature and shape of the externality is not important for our results, as long as it is an increasing function of industry profits.

$$\zeta \equiv \Pr(\epsilon = \eta).$$

The parameter ζ denotes the congruence between public interest and politicians' preference ex-post. When $\zeta = 1$, politicians always care about the industry that needs protection. When $\zeta < 1$, they sometimes care about the industry that does not need protection. Aggregate welfare is

$$W(\epsilon, \eta; \theta) = \bar{U}(\theta) + \alpha 1_{\eta=\epsilon} \pi(\bar{m}_\theta).$$

The founding fathers choose θ to maximize

$$V_0 = \max_\theta \mathbb{E}[W(\epsilon, \eta; \theta)] = \bar{U}(\theta) + \alpha\zeta\pi(\bar{m}_\theta)$$

It is easy to see that the optimal choice is to set $\theta\gamma = \alpha\zeta$.

Lemma 5. *In a closed economy (one country), the politicians choose a regulatory framework with influence parameter*

$$\bar{\theta} = \frac{\alpha}{\gamma}\zeta$$

This model is formally equivalent to the model we have used so far if we set $\beta = \frac{\alpha}{\gamma}\zeta$.

C.5 N Countries

We can also extend our analysis to the case of N countries and N goods. For simplicity we normalize the $z_i's$ to 1. Indirect utilities are given by

$$U_i = \sum_{j=1}^{N} \log(x_j) - N x_i$$

and profits are

$$\Pi_i = N(1 - x_i)$$

The regulator therefore maximizes

$$\max_{\{\mu\}} (1-\theta) \sum_{i=1}^{N} U_i + \theta V_\epsilon$$

With probability $1/N$, country 1 gets to influence the regulator. In that case, the regulator solves

$$\max_{\{\mu\}} U_1 + (1-\theta) \sum_{j=2}^{N} U_j + \theta\gamma\Pi_1$$

This is equivalent to maximizing

$$(1+(N-1)(1-\theta))\sum_{j=1}^{N}\log(x_j)-Nx_1-N(1-\theta)\sum_{j=2}^{N}x_j+N\theta\gamma(1-x_1)$$

The solution is

$$x_1(\epsilon=1)=m_\theta^N=\frac{1-\frac{N-1}{N}\theta}{1+\theta\gamma}$$
$$x_j(\epsilon=1)=M_\theta^N=\frac{1-\frac{N-1}{N}\theta}{1-\theta}$$

Country 1's favorite choice of θ at the design stage maximizes

$$\begin{aligned}\mathbb{E}\left[U_1(\epsilon,\theta)+\beta\Pi_1(\epsilon,\theta)\right]&=\frac{1}{N}\left(\log\left(m_\theta^N\right)+(N-1)\log\left(M_\theta^N\right)-Nm_\theta^N+N\beta\left(1-m_\theta^N\right)\right)+\frac{N-1}{N}\left(\log\left(m_\theta^N\right)+(N-\right.\\&=\log\left(m_\theta^N\right)+(N-1)\log\left(M_\theta^N\right)-(1+\beta)m_\theta^N-(N-1)(1+\beta)M_\theta+N\beta\end{aligned}$$

If we abstract first from regulatory over-reach by keeping M_θ^N constant, we see that the optimal choice of m_θ^N would be again $\frac{1}{1+\beta}$. From the functional form of m_θ^N this requires increasing independence as N increases $\theta^{(N)}=\frac{\beta}{\gamma+(1+\beta)\frac{N-1}{N}}$.

If we consider now the full problem, including regulatory over-reach, we see that M is a strictly increasing function of θ. We can thus write $M(m)$ as a decreasing function and use m as a choice variable. The first order condition is

$$\frac{1}{m}=1+\beta+(N-1)\frac{\partial M}{\partial m}\left(1+\beta-\frac{1}{M}\right)$$

Since $M>1$, $\frac{\partial M}{\partial m}\left(1+\beta-\frac{1}{M}\right)<0$ and therefore m is larger than $(1+\beta)^{-1}$. This proves $\theta^{(N)}<\bar{\theta}$. We have

$$\frac{\partial\log m}{\partial\theta}=\frac{-\gamma}{1+\gamma\theta}-\frac{\frac{N-1}{N}}{1-\frac{N-1}{N}\theta}$$

and

$$\frac{\partial\log M}{\partial\theta}=\frac{1}{1-\theta}-\frac{\frac{N-1}{N}}{1-\frac{N-1}{N}\theta}$$

When $\theta=0$ and $m=M=1$, we have $\frac{\partial M}{\partial\theta}=\frac{1}{N}$; $\frac{\partial m}{\partial\theta}=-\gamma-\frac{N-1}{N}$ therefore

$$\frac{\partial M}{\partial m}(1)=-\frac{1}{N\gamma+N-1}$$

Thus if we estimate at $m=M=1$,

$$1+\beta+(N-1)\beta\frac{\partial M}{\partial m}(1)=1+\beta\left(\frac{\gamma}{\gamma+\frac{N-1}{N}}\right)>1$$

Thus $\theta^{(N)}>0$ but decreasing in N. In the limit of large N, we get a finite slope $\beta\left(\frac{\gamma}{\gamma+1}\right)$ starting from the

efficient allocation.

D Appendix for Sections 3 to 5: Model Predictions

D.1 History of Antitrust and Regulatory Institutions on both Sides of the Atlantic

D.1.1 Antitrust Institutions in the US

Antitrust laws are influenced by the evolution of market structure, business practices, and economic analysis. The Sherman Act of 1890 was motivated by the growth of large-scale businesses during the industrial revolution. The Clayton Act of 1914 was the first attempt to deal with anti-competitive mergers and acquisitions. It was motivated by larger mergers that fell outside the purview of the Sherman Act of 1890. The Clayton Act prohibited any company from buying the stock of another company when "the effect of such acquisition may be substantially to lessen competition".[45] In the 1950's the Clayton Act was expanded to include assets as well as stock acquisitions.

The economic understanding of antitrust has also evolved significantly over time, in particular following the Chicago school revolution, which put economic efficiency at the center of antitrust policy, and the influential book by Robert Bork (Bork, 1978). As Kwoka and White (2014) explain "the skepticism and even some hostility toward big business that characterized the initial period of antitrust have been replaced by current policy that evaluates market structure and business practices differently." For instance, high concentration does not necessarily imply market power. These evolutions are reflected in the various vintages of the *Merger Guidelines*, initially developed by the DoJ's Antitrust Division in 1968. Major revisions to the guidelines took place in 1982 and 2010.

At the federal level, the relevant responsibilities are mostly divided between the DoJ Antitrust Division and the Federal Trade Commission (FTC), although some industries, such as railways and Telecoms, also have their own regulators. The FTC is a quasi-judicial, independent regulatory agency led by five commissioners. Each commissioner is nominated by the President, confirmed by the Senate, and serves a seven-year term. The terms are staggered and no more than three commissioners can be from the same political party. The President designates one of the commissioners as the Chairman. The DoJ is part of the executive branch, operating under the US Attorney General. An Assistant Attorney General, nominated by the President and confirmed by the Senate, leads the Antitrust Division. The authorities of the FTC and DoJ can overlap, but in practice they tend focus on particular industries or markets. For example, the DoJ typically investigates mergers in the Financial Services, Telecommunications, and Agricultural Industries, while the FTC typically investigates mergers in the Defense, Pharmaceutical, and Retail Industries. Before opening an investigation, the agencies consult with one another. State Attorney Generals (AGs) and private courts also play a role in antitrust enforcement. State AGs can bring actions to enforce their state's own antitrust laws, either as federal antitrust suits on behalf of individuals residing within their states, or on behalf of the state as a purchaser. Similarly, private plaintiffs may bring civil actions for violations of the federal antitrust laws, with

[45] This is from Section 7 of the Clayton Act. A distinctive feature of Section 7 is that it lowered the standard of proof for the anti-competitive effects. Under Section 7, mergers could be forbidden when "the trend to a lessening of competition in a line of commerce was still in its incipiency," whereas the Sherman Act requires proof of extant harm to competition, as explained in Institute (2013). The original Section 7, enacted in 1914, only prohibited the acquisitions of "stock" of one corporation by another corporation, and, by its explicit term, it was not applied to the "assets" acquisitions. As a result, businesses found their ways to evade the prohibition by buying target corporation's assets. Congress amended Section 7 to fix this loophole.

the exception of cartel and mergers (see OECD (2015) for additional details on the interplay between public and private enforcement).

D.1.2 Antitrust Institutions in Europe

The history of EU antitrust is more recent. In 1957 the Treaty of Rome laid the foundations of European competition policies, building on the Treaty of Paris that established the European Coal and Steel Community (ECSC) in 1951. Article 3(1)(g) of the Treaty of Rome envisions "a system ensuring that competition in the internal market is not distorted". Council Regulation 17 made the enforcement powers effective in 1962, and the EU Commission made its first decision in 1964. This regulation was modernized by regulation 1/2003, which has been effective since May 2004. Articles 101 (ex. 81) of the Treaty of Rome deals with horizontal conduct, vertical restraint, licensing, and joint ventures. Article 102 (ex. 82) deals with the anti-competitive effects of dominant position. Merger regulations were added in 1989. Member states have national competition authorities (NCAs) to deal with cases that have national impact. The European Commissioner for Competition and the Directorate-General for Competition (DG Comp) enforce European competition law in cooperation with the NCAs. DG Comp prepares decisions in three broad areas: antitrust, mergers, and state aid.

An interesting debate – and important for our analysis – concerns the influence of the US on Europe. This debate has evolved in three stages. At first, the common wisdom was that EU laws were direct descendants of US laws. Berger (1998) challenged this view and showed that EU laws also had their own "indigenous" traditions. Since then, scholars have reached a more balanced view. For instance, Leucht and Marquis (2013) study the exchange of ideas between the US and Europe and Leucht (2009) explores how the traditionally protectionist economies of Western Europe agreed on common competition rules. Nonetheless, the overall theme is that ideas and institutions have largely converged across regions.

Some changes in recent years have been more qualitative but nonetheless important. In particular, the 2004 changes made the DG Comp more transparent and more accountable to the public. It also clarified the notion of unilateral effects in a way that resembles the US approach. Foncel et al. (2007) focus on important changes in the new EC Merger Regulation of 2004. At the same time, the role of economists within the DG comp has increased during the 2000's, in particular with the creation of the position of Chief Competition Economist in 2003. The position of EU commissioner for competition is prestigious, attracts high caliber politicians, and benefits from strong public recognition.

D.1.3 Regulatory Institutions in the US

The US began a long process of economic deregulation in the 1970s which, over the next three decades, would cover the Air (1978), Road (1980) and Rail (1981) transportation industries, Electric Power (1978+), Natural Gas (1978), Banking (1980) and Telecommunications (1996) (OECD, 1999). The process of deregulation was deemed a success, with estimates of price reductions ranging from 30-75% across sectors, in addition to improved product quality and choice (OECD, 1999). In 1999, the OECD noted that the *"United States has been a world leader in regulatory reform for a quarter century. Its reforms and their results helped launch a global reform movement that has brought benefits to many millions of people"*.

The deregulation process was led by the Federal Government, though State and Local governments also have regulatory responsibilities. At the federal level, new laws are written only by congress; but more than 60 executive agencies are authorized to issue subordinate regulations. Indeed, these executive agencies issue thousands of new regulations each year. Federal Regulations are compiled in The Code of Federal Regulations (CFR).

Importantly, economic deregulation did not coincide with a reduction of total regulation. Environmental, health, and safety regulations increased substantially over the same period – and have continued to increase. As of 2017, the CFR spans nearly 180,000 pages following an eight-fold expansion over the past 56 years (Davis, 2017). The substantial rise in the scale and complexity of Federal Regulation has led some authors to argue that excessively complex regulations are increasing barriers to entry.

State and Local government regulation further add to the regulatory burden. It is harder to summarize the scale or growth of such regulation, but the increase has also been significant. Occupational Licensing is an area that has received substantial attention. CEA (2016), for example, show that the share of workers required to obtain a license increased from under 5 percent in the 1950s to over 25 percent in 2008 – in large part because of greater prevalence of licensing requirements at the State-level.

D.1.4 Regulatory Institutions in Europe

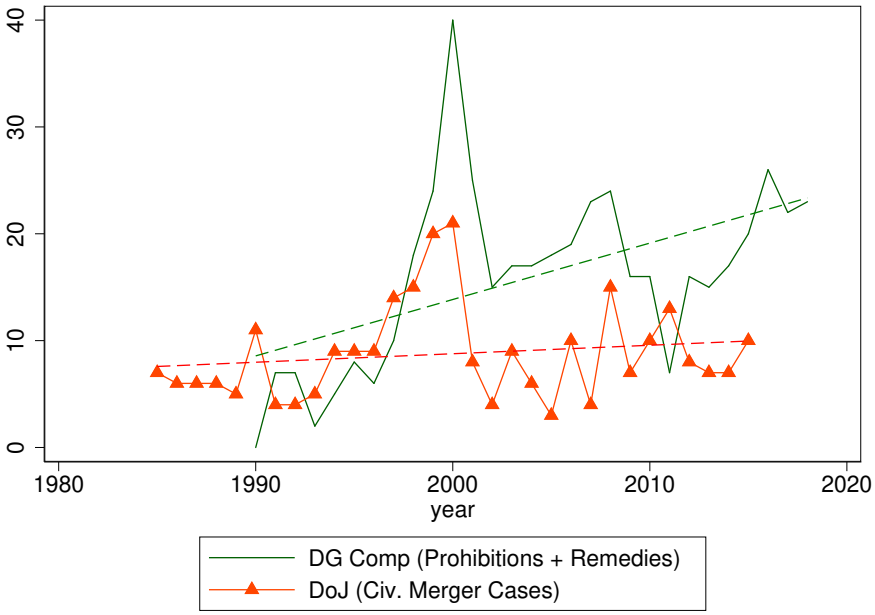
As with Antitrust, regulatory reform efforts in the EU are more recent. Some countries (such as the UK) pursued economic deregulation independently as early as 1979. But concerted, EU-wide reform efforts started (on a limited scope) in 1985 with the Single Market Plan, and accelerated in the 2000s with the introduction of the Lisbon Strategy.[46] With regards to product market competition, the Lisbon Strategy aimed *"at opening up product markets to competition in particular by completing the internal market for goods and services, by removing obstacles to competition in Member States and by creating a business environment more conducive to market entry and exit." (Zeitz, 2009)* While the Lisbon Strategy failed in other dimensions, substantial product market reforms were implemented. And today, it is hard to under-state the increase of competitiveness arising from a single market – and for many countries, a single currency (Gilchrist et al., 2017). Indeed, European economies have some of the lowest barriers to trade and foreign investment in the world.

Importantly, EU institutions have only partial oversight over Member State's regulatory environments. The EU can either directly prohibit certain domestic regulations (e.g., prohibition of Golden Shares and price controls in transportation industries), can work with member countries to achieve mutual recognition of restrictions, or can enact case law based on a treaty (e.g., ongoing regulation of State Aid by DG Comp). But beyond that, member states must implement reforms directly. This does not mean, however, that the EU has no influence over reform efforts.

Take the implementation of the Lisbon Strategy, for example. The overall objectives were set jointly by the EU and Member States. From then on, Member States were in charge of implementation, but were also required to submit reports to the European Commission on an on-going basis: the so-called Cardiff

[46]The Lisbon Strategy aimed to make the EU "*the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion*" by 2010 (link).

Figure 42: *Merger Enforcement: DG Comp vs. DoJ*



Notes: Civil Merger Cases from DoJ Annual Reports for the US. Number of Phase I and Phase II decisions by DG Comp involving prohibitions (out of scope) or remedies (compatible w. commitments), as reported in link.

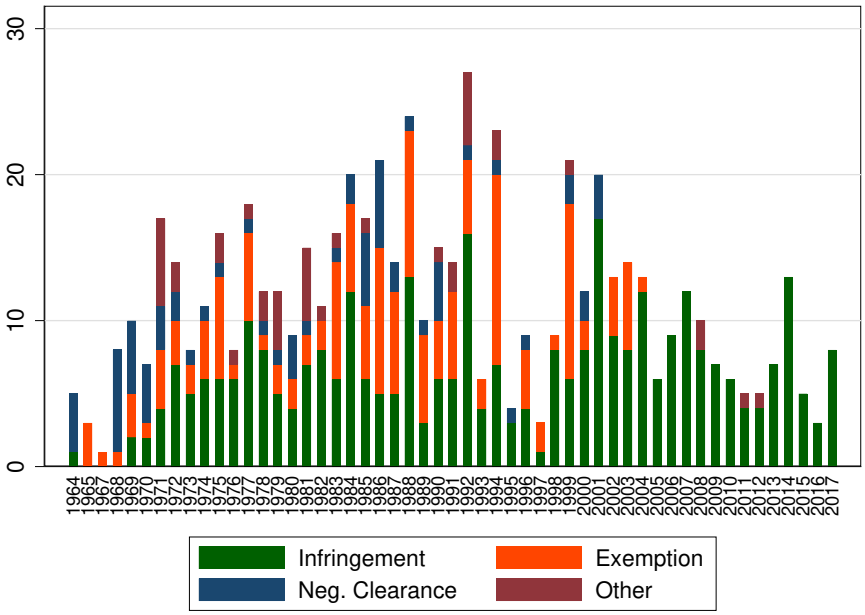
Reports from 200-2004, followed by National Reform Programs and implementation reports. The EU used those reports to continuously monitor and disclose progress – including the creation of the Microeconomic Reform database (MICREF) which compiled and tracked progress across all states. Indeed, EU and peer pressure were seen as key 'embarrassment tools' available to encourage reform. And, if countries still fail to implement required reforms, the Commission may curtail the allocation of the EU Cohesion Funds. Last, for states in the process of accession, stringent reform requirements are negotiated in advance – as evidenced by the substantial reforms implemented at new EU Member States in Central and Eastern Europe (Jens and Johannes, 2004).

D.2 Proposition 1: Tougher and More Independent Regulator

This section presents additional results on enforcement activity in the US and Europe. Figure 42 shows that the number of merger challenges increased for DG Comp yet remained stable for the DoJ. This is true despite relatively lower merger activity in the EU than US and lower concentration ratios as noted in the introduction.

Figure 43 shows that the number of formal decisions made by DG Comp on non-merger cases has remained relatively stable since 1964. According to Carree et al. (2010), the early upward trend reflects DG Comp's growing legitimacy and jurisdiction, while the 1990s decrease is due to changes in DG Comp's policies such as the creation of a block exemption regulation system and a stronger reliance on comfort letters instead of official decisions. In addition, around 1989 the DG Comp was burdened with enforcement of the then new merger control regulation. Up until the late 1990s, nearly half of the formal decisions related to

Figure 43: *Number of Formal Non-Merger Decisions taken by DG Comp*



Notes: List of formal decisions from 1964 to 2009 based on Russo et al. (2010), extended through 2017 based on DG Comp's Case Database available at link. Outcomes gathered and mapped manually from DG Comp's website.

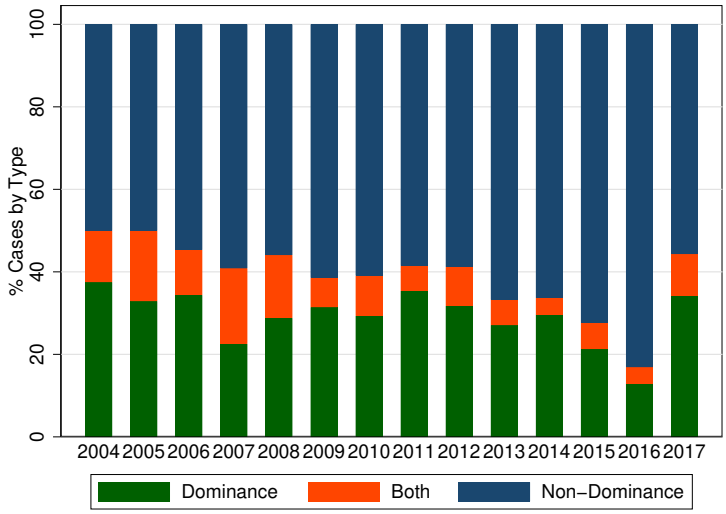
exemptions (where the practice is allowed to continue) and negative clearance (where the practice is deemed to be in compliance with regulation). Such decisions essentially disappear in recent years, as the commission resolves nearly all such cases without formal decisions. Focusing on the number of infringements (i.e., actual violations), the number of formal decisions has been essentially flat – or even increased since 2000.

Figure 44 shows that Dominance remains an active area of enforcement in Europe not only for DG Comp but also for National Competition Agencies. Indeed nearly 40% of cases since 2004 relate to Abuse of Dominance.

Figure 45 highlights the shift in US Cartel Enforcement towards individuals. The left plot shows that the number of cases has remained relatively stable (thick solid line) despite a declining number of investigations (triangles) and Corporations charged (circles). The reason for this is a shift towards prosecuting individuals (squares). Indeed, the number of corporations charged per investigation has remained stable, yet the number of individuals charged increased drastically since the Financial Crisis (middle plot). This is the result of a policy decision that increased the focus on prosecuting individuals starting in the late 1990s (for example, Hammonds (2001) noted in 2001 that "an individual defendant faces a greater risk of jail time today than even a few years ago").

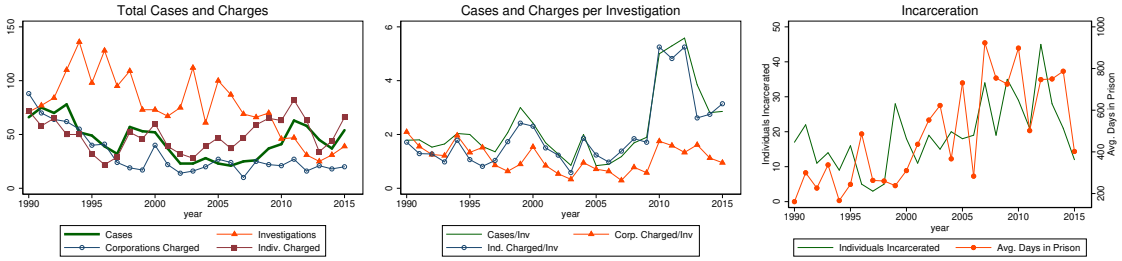
Last, figure 46 plots the number of cases in the US and Decisions in Europe for Other Restraint of Trade violations. This is generally a less active area than either Cartel or Abuse of Dominance. It includes Joint Ventures, Marketing and Advertising Agreements and Exchange of Information, for example. As shown, There has been a clear decrease in the US. The decrease in Europe is mainly a measurement issue. Many decisions before 2000 were exemptions and negative clearance, which do not constitute violations. Since

Figure 44: *Composition of EU Non-Merger Enforcement (DG Comp + NCAs) by Type of Economic Conduct*



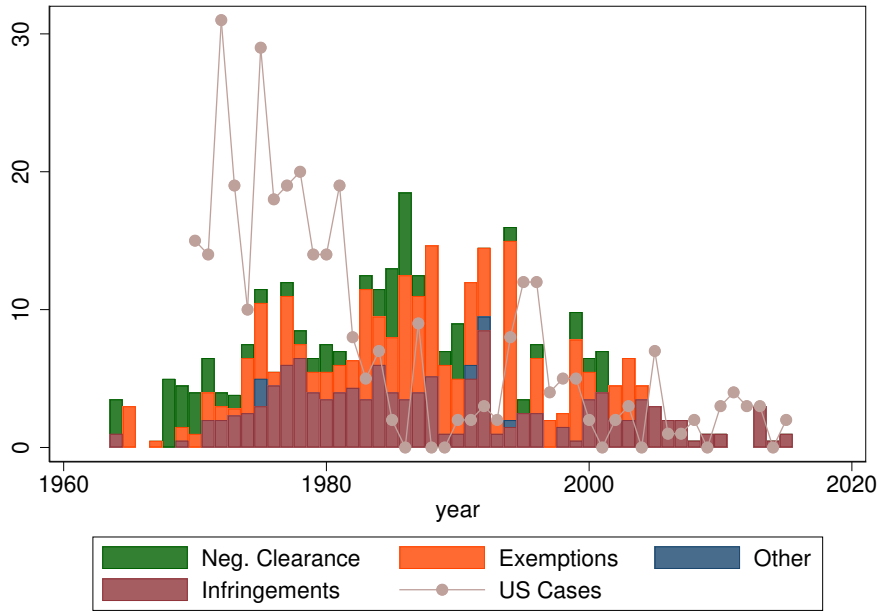
Source: European Competition Network statistics available at link

Figure 45: *Details on US Cartel Enforcement*



Notes: DoJ Annual Reports

Figure 46: *Enforcement Activity for Other Restraint of Trade, EU vs. US*



Notes: DoJ Annual Reports for the US. List of formal decisions from 1964 to 2009 based on Russo et al. (2010), extended through 2017 based on DG Comp's Case Database available at link. Outcomes gathered manually from DG Comp's website. Commitments on violations included only after 2009.

then, such cases have increasingly been resolved without formal decisions. In fact, DG Comp has resolved even some violations with commitment letters as opposed to formal decisions. Counting both infringements and recent commitment letters on violations (red and blue bars, respectively), EU enforcement has been relatively stable.

D.3 Proposition 2: Cross-sectional Implications

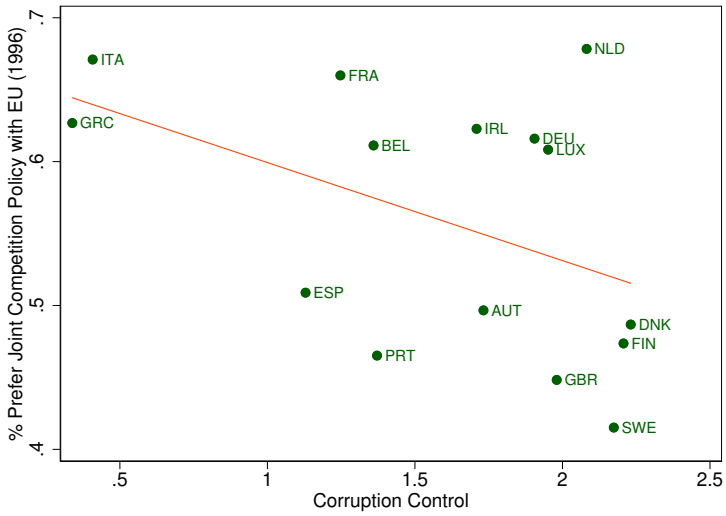
Antitrust. Figure 47 uses responses to the 1996 Eurobarometer survey to show that citizens of countries with weaker institutions (as of that date) had stronger preferences for delegation of Competition Policy to the EU.[47] This suggests that citizens of the corresponding countries realized the benefits from delegation to a more independent supra-national institution.

Regulation. Figure 48 shows that countries with initially weaker institutions started with higher levels of PMR in Europe as well as the rest of the world. Since then, PMR indices converged across levels of Corruption Control in the EU, but did not in the rest of the world. Non-EU countries continue to exhibit strong positive relationship between PMR and Corruption Control even in 2013.[48]

[47] We use surveys as of 1996 to mirror the timing of institutional design and to mitigate the impact of the crisis on political opinions. We obtain similar results for Consumer Protection and Economic Policy, especially among the EU15. Results including the 12 New Member States that joined after 2004 are less robust for Competition Policy, though these states had little influence in creating the regulator.

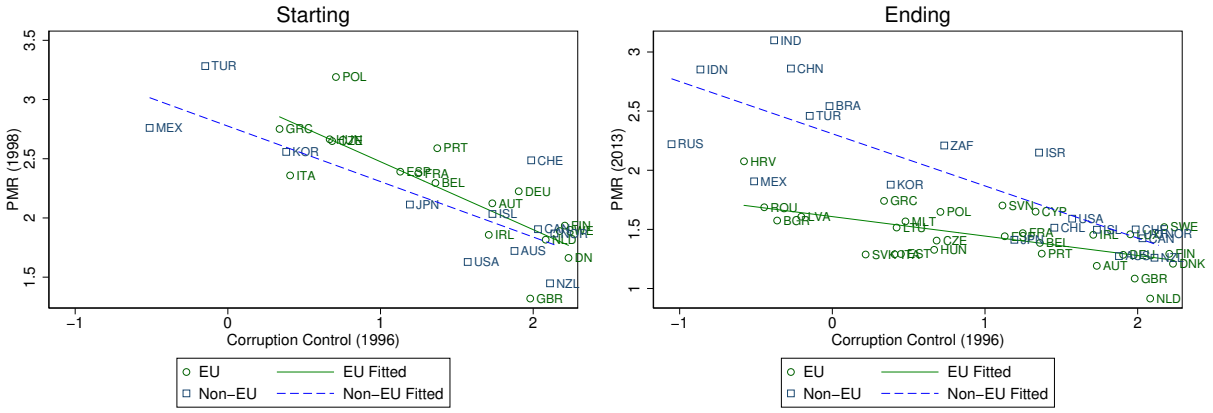
[48] The ending plot includes additional countries which enter the sample. We include all countries in the plot, but note that the relationship is equally strong restricting the sample of countries to those with PMR scores as of 1998

Figure 47: *Preferences for Delegation: Competition Policy*



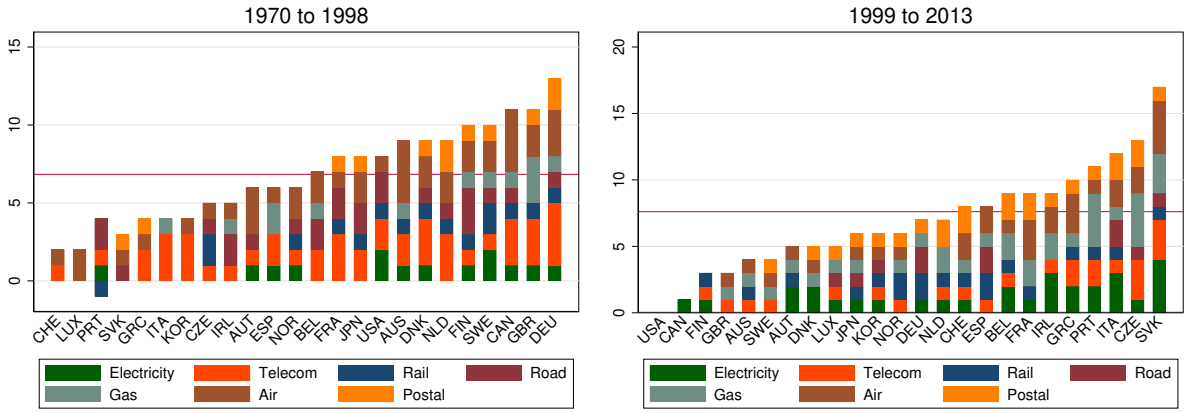
Source: Figure plots the percent of respondents to Eurobarometer 1996 Survey which responded "Jointly within EU" to the question: "For [Competition Policy], do you think that decisions should be made by the (NATIONALITY) government, or made jointly within the European Union?".

Figure 48: *PMR Convergence vs. Corruption Control: Starting and Ending Levels*



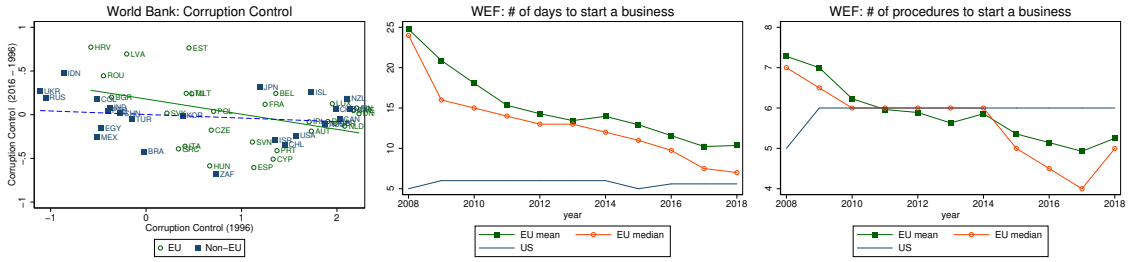
Source: Figure shows each country's PMR score as of 1998 and 2013 against the World Bank's measure of Corruption Control as of 1996. The differences in slopes on right panel are statistically significant (t-stat of 3.52).

Figure 49: *Product Market Reforms, US vs EU*



Note: OECD PMR

Figure 50: *World Bank and WEF measures*



Source: Left panel shows the change in the World Bank's measure of Corruption Control from 1996 to 2016 against the starting value. Middle (right) panel shows the mean and median number of days (procedures) required to start a business in the EU compared to the US, as measured by the WEF.

Figure 49 plots the reforms implemented by each European country and the US, by sector. As shown, the US implemented about the average number of reforms before 1998, but countries such as Germany and UK implemented far more. Moreover, these countries continued to implement reforms across a wide range of sectors after 1998, while the US essentially stopped.

Last, Figure 50 reports selected indicators from the World Bank and WEF. The left panel shows that EU countries improved measures of Corruption control faster than non-EU countries (although the differences are not statistically significant).[49] The middle and right panels show that EU countries substantially reduced the time and number of procedures to start a business, with the average and median country being close to or better than the US.

D.4 Real Effects

Table 7 confirms the positive correlation between Product Market Regulation, profits and concentration.

[49] Similar results are obtained for Government Effectiveness

Table 7: *Real Effects of PMR*

Table reports regression results of profitability and concentration on the level of PMR, with country and country-industry fixed effects. Measures of profitability from OECD STAN; concentration from ORBIS. Similar results obtained using CompNET. Standard errors clustered at the country-level in brackets. All regressions weighted by country-industry value added from OECD STAN. + p<0.10, * p<0.05, ** p<.01.

	(1) PR_t^c	(2) $PR_{j,t}^c$	(3) $CR4_{j,t}^c$
PMR_{t-1}^c	0.032*	0.050*	0.007
	(0.012)	(0.020)	(0.027)
Year FE	Y	Y	Y
Country FE	Y	Y	N
Country-Ind FE	N	N	Y
R^2	0.95	0.57	0.95
N	112	2141	460

E Data

The data sources used throughout the paper are summarized in Table 8. Items in italics are included in the main analysis dataset used in regression analyses. These include industry-level macro data from OECD STAN and EU KLEMS 2017; concentration measures constructed from Compustat (US and EU) and BvD ORBIS (EU); and a compilation of antitrust cases detailing the relevant industry and type of economic conduct by case. We describe the data gathering and mapping exercise for these datasets in the remainder of this section. The data sources in upright text are used to generate the remaining Tables and Figures in the text. The associated data sources and manipulations are fully described in the text.

E.1 EU KLEMS

We start with the September 2017 release of EU KLEMS, available at link. This release covers data for 29 countries – the EU-28 plus the United States. We focus on the output datasets, particularly the value added and value added-implied TFP series.

Data is sourced across all countries as reported, and aggregated to the segments of Dottling et al. (2017) in order to use the corresponding ORBIS concentration series. To be specific, KLEMS data is available at the sector level (19 groups) following the ISIC Rev. 4 hierarchy. Data for some sectors is further broken out (e.g., manufacturing is split into 11 industries), resulting in 34 categories. However, data is not always for the most granular segments (e.g., capital data for segments D45, D46 and D47 is missing for several countries), We consider the most granular segments for which data is available, which includes 31 categories. We then exclude Real Estate (L), Public Administration (O), Households as employers (T) and activities of extra-territorial bodies (U); leaving 27 industry groupings, as summarized in Table 9. Segments listed as 'excluded' are excluded from our analyses. Those with a '0' are captured by other (typically more granular) categories. All other datasets are mapped to these 27 industry groupings. All nominal quantities are converted to dollars using the OECD's exchange rates, available at link.

Table 8: *Summary of Data sources*

Type	Source	Main data fields	Granularity
Industry and macro-data	OECD Statistics	GDP, Exchange Rates and NFC financials by Country	Country
	OECD STAN	*Industry Macro-data (Value Added, GOS, Production)*	*ISIC Rev. 4, ∼Level 0 to 2*
US Concentration	*Compustat North America*	*US public firm CRs and HHIs*	*Firm, aggregated to EU KLEMS*
	US Economic Census	US-wide concentration ratios and Herfindahls	NAICS2-6
EU Concentration	*Compustat Global*	*EU public firm CRs and HHIs*	*Firm, aggregated to EU KLEMS*
	BvD ORBIS (Kalemli-Ozcan et al., 2015)	*EU concentration ratios and HHIs*	*Firm, aggregated to EU KLEMS*
	ECB's CompNET	Concentration Ratios and HHIs	ISIC Rev. 4, L2
	EU KLEMS 2008	HHIs	ISIC Rev. 3, L2-3
PPP data	*ICP via OECD*	*PPP indices and product prices*	*Country and Product*
KLEMS	*EU KLEMS 2017*	*Produced Prices, TFP and wages*	*ISIC Rev. 4, ∼L2*
PMR indicators	OECD PMR indicators (Koske et al., 2015)		Country and Sector
	Product Market Reform database (Duval et al., 2018)		
Antitrust Indicators	OECD Competition Law & Policy Indicators (Alemani et al., 2013)		Country
	Hylton and Deng Antitrust Indicators (Hylton and Deng, 2006)		Country and region
Enforcement Activity	DoJ Annual Reports	# of investigations, cases, fines, etc. by type of economic conduct	US
	DG Comp Formal Decisions	# of formal decisions (Russo et al., 2010) and outcomes (DG Comp website)	EU
	European Competition Network	# and type of cases	EU + NCAs
	DG Comp Cartel statistics	# of cases and fines	EU
Case Databases	*DoJ and FTC Online Case Databases*	*# of cases (by year, type and industry)*	*Case*
	DG Comp Online Case Database		*Case*
US Political Expenditures	Center For Responsive Politics (CRP)	US Federal Lobbying and Campaign Contributions	Contributor
	FollowTheMoney.org	US State lobbying and campaign contributions	Contributor
EU Political Expenditures	LobbyFacts	EU lobbying expenditures	Contributor
	European Parliament (EU, 2015)	EU campaign expenditures	Country
Other Governance Indicators	World Bank Worldwide Governance Indicators	Governance Indicators	Country
	WEF Global Competitiveness Indexes	Competitiveness indicators	Country
	EuroBarometer Surveys	Citizen delegation preferences	Country

Table 9: *Summary of Data sources*

KLEMS code	Industry name	Included?	Segment code
TOT	All	0	
MARKT	Market Economy	0	
A	Agriculture	1	D01T03
B	Mining	1	D05T09
C	Mfg	0	
10-12	Mfg_Food	1	D10T12
13-15	Mfg_Textiles	1	D13T15
16-18	Mfg_Wood	1	D16T18
19	Mfg_Petroleum	1	D19
20-21	Mfg_Chemical	1	D20T21
22-23	Mfg_Rubber	1	D22T23
24-25	Mfg_Metal	1	D24T25
26-27	Mfg_Electrical	1	D26T27
28	Mfg_Machinery	1	D28
29-30	Mfg_Transport	1	D29T30
31-33	Mfg_Other	1	D31T33
D-E	Utilities	1	D35T39
F	Construction	1	D41T43
G	Whole_Sale_and_RET_Trade	1	D45T47
45	Trade_motor	0	
46	Whole_Sale_non-motor	0	
47	Retail_nonmotor	0	
H	Transp_and_storage	1	D49T53
49-52	Transp_and_storage	0	
53	Courier	0	
I	Acc_and_food	1	D55T56
J	Inf_and_comp	0	
58-60	Inf_Publishing	1	D58T60
61	Inf_Telecom	1	D61
62-63	Inf_IT	1	D62T63
K	FS	1	D64T66
L	RE	Excluded	D68
M-N	Prof_Serv	1	D69T82
O-U	Com_Serv	0	
O	Public_Adm	Excluded	D84
P	Education	1	D85
Q	Health	1	D86T88
R-S	Arts_and_Rec	0	
R	Arts_and_Rec	1	D90T93
S	Other_Serv	1	D94T96
T	HH	Excluded	D97T98
U	Other_Serv	Excluded	D99

E.2 OECD STAN

Our second main source is OECD STAN. We use data from OECD Table STANI4_2016, which follows ISIC Rev. 4 segments. These data are available for 36 countries including the EU-28, the US as well as several other advanced economies (including Australia, Japan, Korea, Canada, Switzerland and Chile). That said, we restrict the sample to the EU plus US in our regression analyses. Both KLEMS and STAN are defined based on ISIC Rev. 4, yet STAN provides more granularity than KLEMS. As a result, we can map STAN to our chosen KLEMS segments directly.

STAN includes measures of production, intermediate inputs, value added, labor costs, (gross and net) operating surplus, employment, and capital. Our main analysis fields include:

- Value added (VALU)
- Production (gross output) at current prices (PROD)
- Gross operating surplus and mixed income (GOS)
- Net operating surplus and mixed income (NOS)

We convert all nominal quantities to US dollars using the OECD's exchange rates, available at link. And then define the profit rate as the ratio of GOS to PROD.[50] We aggregate across EU countries by taking the weighted average (by the corresponding denominator in each ratio).

E.3 Compustat

We use Compustat North America and Compustat Global to compute US and EU-wide concentration ratios. Compustat includes all public (and some private) firms in the US and EU. US (EU) data are available from 1950 (1987), but coverage is fairly thin until the 1970s (late-1990s). In particular, we download tables Funda, Company and exrt_mth from both datasets. We use the reported exchange rates to convert all financials to USD. We apply standard screens (consol = "C", indfmt = "INDL", datafmt = "STD", popsrc = "D" for the US) and exclude firm-year observations with missing year, sales, assets, or $gvkey$.[51] We focus on the 1990 period for the US and post-2000 period for the EU, and assign firms to countries using headquarter location (LOC). We use a shorter period for the EU because several stock markets are added beforehand, resulting in drastic changes in coverage. The sample stabilizes by the early 2000's.

We use the industry codes in the Compustat Company table. NAICS codes are missing for few firms, so we map those firms to the most common NAICS-4 industry among those firms with the same SIC code and non-missing NAICS. We also map all retired/new NAICS codes from the 1997, 2002 and 2012 versions to NAICS 2007 using the concordances in link. We then map firms to our desired segments using the NAICS 2007 to ISIC Rev. 4 concordance available at link. In particular, we map each NAICS-6 segment to the most common ISIC Level 2 segment (by number of mappings) based on the the concordance. This mapping

[50] Most of our results are robust to using net profit rates (OS/PROD or OS/VA). However, depreciation series are often available over shorter periods and can be quite volatile in some segments (see Dottling et al. (2017)) so we focus on Gross Operating Surplus.

[51] We also address selected data issues manually (e.g., outliers in sales growth, especially when reported currency changes)

is one-to-one for most NAICS-6 segments; and for the remaining segments there is usually a single most common ISIC Level 2 segment. For the few cases where NAICS-6 segments map with equal likelihood to more than one ISIC Level 2 segment, we follow the same methodology but with NAICS-5 codes (and so on).[52] We then map each ISIC Rev. 4 Level 2 segments to our selected KLEMS industries.

We use the resulting dataset to compute Concentration Ratios. Compustat coverage as a share of the economy varies over time (as more firms go public) and across industries (depending on the nature of production). To ensure CRs are stable over time and across industries, we adjust Compustat CRs for database coverage using total gross output from OECD STAN:

$$CR4_{jt} = \frac{\sum_{i \in \{j,\text{top4}\}} sale_{it}^{CPSTAT}}{s_{jt}^{CPSTAT}} \times c_{jt}^{MA}$$

where s_{it}^{CPSTAT} denotes sales for firm i which belongs to industry j and s_{jt}^{CPSTAT} denotes sales across all Compustat firms in industry j. c_{jt}^{MA} denotes the coverage adjustment, equal to a three-year centered moving average of the yearly coverage ratio ($c_{jt} = \frac{s_{jt}^{CPSTAT}}{s_{jt}^{STAN}}$, where s_{jt}^{STAN} denotes gross output from STAN).[53] We use a moving average to smooth the impact of FX volatility given that Compustat sales include both domestic and foreign sales. c_{jt} can exceed 1 for exporting industries and may be affected by FX volatility even if 'real output' coverage remains flat.[54] So we cap c_{jt}^{MA} at 1.25 (which assumes slightly higher domestic CR relative to global CRs). Last, to ensure the estimated CRs are robust and stable, we include only industries where average database coverage after 2000 exceeds 15%.

For some of our tests, we also estimate adjusted Herfindahls as

$$HHI_{jt}^{Adj} = HHI_{jt}^{CPSTAT} \times \left(c_{jt}^{MA}\right)^2,$$

where the coverage adjustment assumes that private firms are infinitesimally small and therefore do not contribute to industry Herfindahls.

E.4 BvD ORBIS

We also compute concentration series for Europe, based on the BvD ORBIS dataset of Kalemli-Ozcan et al. (2015).[55] The dataset includes firms categorized as Very Large, Large and Medium from 1999 to 2012. It covers the ten major European economies included in the December 2016 KLEMS release (AUT, BEL, DEU, ESP, FIN, FRA, GBR, ITA, NLD and SWE). To avoid double-counting, only unconsolidated accounts (codes C1 and C2) are included. We drop firms with turnover below zero and winsorize total assets and

[52] In some cases, Compustat NAICS codes contain fewer than six digits. In that case, we repeat the process using NAICS-5 to NAICS-2 codes. Firms that cannot be mapped to an ISIC segment (those with 'other' NAICS code 999 are excluded from industry quantities).

[53] To ensure consistency between STAN output and Compustat sales, we drop firms in country x industry x years where STAN data is not available. This means our EU-wide series includes 23 countries (EU28 ex Bulgaria, Croatia, Cyprus, Malta, Romania).

[54] The exchange has a particularly severe impact after 2014. To mitigate this, we set the coverage ratio equal to the average from 2002 to 2016 for all years after 2014.

[55] We are very grateful to Sebnem Kalemli-Ozcan and Carolina Villegas-Sanchez for their help computing these series

sales at the 0.1 and 99.9 level. All financials are converted to USD using the OECD's exchange rates. See Dottling et al. (2017) for additional discussion of the dataset.

We obtain Herfindahls (sum of squared market shares) and sales by the Top 4, 8, 20 and 50 firms in each industry for four populations, following our chosen industry segments:

- Each country and industry separately
- The top 50 firms within each country and industry, separately
- Each industry across all EU countries in the sample (i.e., excluding GBR and SWE)
- The top 50 firms within each industry across all EU countries in the sample (i.e., excluding GBR and SWE)

We use the total measures as the basis for our analyses, but confirm conclusions remain when using only the top-50 firms. Restricting to top 50 firms mitigates issues with missing/inaccurate data for small firms.

As for Compustat, ORBIS coverage varies over time. Coverage is very low in 1999 for some countries, so exclude it from our analyses. For the remaining years, we adjust our concentration measures for database coverage using OECD STAN:

$$CR4_{jt} = \frac{\sum_{i \in \{j,\text{top4}\}} sale_{it}^{ORBIS}}{s_{jt}^{ORBIS}} \times c_{jt}^{MA}$$

where s_{it}^{ORBIS} denotes sales for firm i which belongs to industry j, s_{jt}^{ORBIS} sales across all firms in ORBIS industry j. c_{jt}^{MA} denotes the coverage adjustment equal to the three-year centered moving average (lagged for 2012) of the database coverage $c_{jt} = \frac{s_{jt}^{ORBIS}}{s_{jt}^{STAN}}$. We again c_{jt}^{MA} at 1.25 and include only industries where average database coverage after 2000 exceeds 15%. Similarly, adjusted Herfindahls are computed as

$$HHI_{jt} = HHI_{jt}^{ORBIS} \times \left(c_{jt}^{MA}\right)^2,$$

E.5 PPP Data

For our PPP analyses, we use the following data:

- **Country-level results**: Average annual wages in current prices from OECD table AV_AN_WAGE, variable CPNCU. MFP indices from OECD table PDB_GR, variable T_MFP.2010Y. GDP data from OECD Table PDB_LV, variable T_GDP.CPC (for weighting). PPP data from SNA_TABLE4, variables PPPGDP.CD and EXC.CD.
- **Product-level results**: Before 2002, product-level prices are gathered manually from the 1996, 1999 and 2002 ICP Results, published by the OECD. For 2005, 2008, 2011 and 2014, data is gathered from Table 1-12 of the OECD's benchmark PPP results, available at link. Prices use time-varying currencies and benchmark countries, which need to be normalized. We complement price data with

the following EU KLEMS fields: TFP (TFPVA_I), employee hourly wage (COMP/H_EMPE). We use employee hourly wage as opposed to total hourly wage (LAB/H_EMP) because the latter is available only after 2000 in the US.

- **Industry-level results:** We use KLEMS value added price indices (VA_P) because gross output prices are not always available. We measure wages and TFP as above (COMP/H_EMPE and TFPVA_I, respectively), and define value added labor productivity as VA_QI/H_EMPE.

E.6 Antitrust Case Database

Last, we compile a database of recent Antitrust enforcement cases for the US and Europe.

DoJ Cases. DoJ cases up to December 2017 were downloaded manually from link. In total, we obtain 349 Civil Merger, 364 Civil Non-Merger, 1,022 Criminal and 117 Other cases. We exclude "Other" cases from our analyses because they are almost always 'briefs' related to other cases, rather than new investigations of violations. Moreover, they do not appear to be counted as cases in the DoJ's annual report: excluding such cases, we confirm that the number of cases reported by the DoJ and compiled in our database roughly match after 1996. The remaining differences are likely due to timing of case opening dates vs. reporting.

The DoJ's database is structured around the Case Open date, which we use to define the year of each case. The database includes industry codes, following the hierarchy available in link. Some of these codes are based on SIC hierarchies and some are based on NAICS. We manually review the list and assign each code to a hierarchy. For cases including a NAICS code, we drop the corresponding SIC codes. For cases including only SIC codes, we map the corresponding codes to a NAICS-6 code using the SIC87-to-NAICS02 concordance provided by the Census.[56] If more than one NAICS code is reported (either directly, or because more than one SIC codes are given and they map to different NAICS codes), we keep both.

We then map all NAICS codes to EU KLEMS segments following the methodology used for Compustat. We then follow Feinberg and Reynolds (2010) and drop duplicate cases in the same year, type and KLEMS segment and federal court because they often relate to prosecution of different agents (e.g., the corporation and individuals, or multiple individuals) for the same violation.

Last, we aggregate the count of cases by year and type of economic conduct. A small number of cases map to more than one KLEMS segment, in which case we adjust the count accordingly (if a case maps to two industries, we count it as half a case for each).

FTC Cases. FTC cases are gathered manually from link. Data was downloaded in January 2018 and includes 404 Merger cases and 175 Non merger cases. It includes a complete set of cases after 1996. We obtain separate lists by "Competition Topic" of Merger and Non Merger; and for separate Announcement Date years. The latter is used to define the year of Case Opening. The FTC provides only broad industry segments that do not align with either NAICS or SIC segments. We therefore manually map the cases to NAICS industries based on the firms involved in the case and the associated description. As for DoJ cases,

[56] We map to NAICS-2 because no such concordance is available to NAICS07.

we map the cases from NAICS to ISIC Rev. 4 segments following the same methodology as for Compustat firms; and then aggregate to our chosen KLEMS segments. Unlike the DoJ, we do not encounter as many repeated cases for the same violations, so we count all observations separately.

EU Case. Last, cases for DG Comp are gathered from link. We download all Antitrust/Cartel and Merger cases in the database, but restrict our analyses to cases starting between 1999 and 2017 – when the database is reported to be complete. There are a total of 264 merger cases and 625 non-merger cases. The database almost always includes NACE_Codes, which can be easily mapped to ISIC Rev.4 segments and the associated KLEMS segments. When codes are not reported, we manually map the case based on the firms involved. We define as the case opening year as the year of the first announcement for the corresponding case in the database. Note that we include all opened cases in the database, irrespective of the type. Some of these cases are sector inquiries, and need not involve specific firms. We nonetheless view these as informative of DG Comp's activity in promoting competition. As for DoJ cases, whenever a particular case maps to more than one industry, we adjust the count of cases by the number of industries to which the case maps. Like the FTC, DG Comp almost always aggregates violations across firms into single cases (in part because it cannot charge individuals) so we count all cases individually.

The number of cases by type of economic conduct is then aggregated to our chosen KLEMS segments for analysis.