Economic Inequality and Competition Law:
A Comparative Analysis of the USA Antitrust Model

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ABSTRACT

To what extent does the choice of competition law model a relevant factor affecting economic inequality? While competition laws have been suggested as a possible factor contributing to current inequality trends in developed countries, and as a viable instrument to address them, little empirical evidence exists on their distributional effects. The article utilises a unique estimation strategy based on the textual similarity between competition laws, and the General Synthetic Control method to study the relationship between competition laws and economic inequality. By creating a synthetic counterfactual unit from an OECD donor base of actual observations, we test the link between the USA 'model of law' and income inequality across developed countries. We show evidence that the USA model is linked to higher levels of income inequality, compared to the EU competition law model.

JEL: I32; L40, O4, C33, E02

Keywords: Income inequality, Competition law, Antitrust, Panel-data, Synthetic Control Method,

Empirical Legal Studies

I. INTRODUCTION

Despite global, economic growth, economic inequality levels have been increasing in many parts of the world.[1] Researchers and regulators are gathering up the usual suspects: regressive tax policy, trade (globalisation), and technological changes (automation).[2] In the face of the current economic downturn brought about by the Covid-19 pandemic, these trends have intensified.[3] While the effects of competition on economic inequality are debated in the economic literature, the link between competition law and inequality remains understudied. Commentators have recognised that how competition law is structured and applied might contribute to this trend.[4] However, to date, the debate has mostly been limited to abstract legal and policy arguments. Perhaps most critically, the legal discussion has been based on mainstream economic thinking and limited empirical analysis of the actual interaction between competition law and inequality.[5] In this paper, we examine how the choice of 'competition law model' might impact on observed inequality.

While the distributional effect of market power is recognised,[6] most economists have generally eschewed making any further judgments about its consequences, arguing that there is no objective way, or conceptual apparatus to assess how the 'gains' should be distributed.[7] There is also a view that assigning weights to different members of society involves 'political' or 'social welfare' judgments on which economists have no expertise.[8] Some see uneven distributions as a necessary outcome of the competitive process. While abstracting from distributional issues can aid analytical tractability, arguably, they should still be the focus of systematic economic and legal inquiry.

Practically, the effect of competition on economic inequality is more complex, as market power could both harm and benefit individuals, depending on their market position. Two main mechanisms support the proposition that a lack of competition might be associated with higher inequality: Product prices are a first driver linking competition to inequality. Higher prices, in essential product markets (like food and clothes), affects households in a regressive way, as poorer consumers tend to spend more of their income on consumption of these products.[9] Low-income households usually enjoy a tiny piece of the income gains (e.g., think of the employers of a fast-food multinational firm) and even a smaller slice of capital gains. In other words, monopoly gains are not substantially shared with them. Less well-off households consumption patterns and a higher marginal utility of income, the benefit to these households would be even greater than the same price affects for the rest of society.[10] On the opposite side of consumer markets, the financial sector, low levels of competition enabled a small group of employees and shareholders to seize a disproportionate share of all profits.[11] Financial services (products) cost has gone up when it should have been going down due to industry improvements.[12]

A second driver linking competition and inequality is wage suppression in labour markets. When only a small group of employers are looking to hire employees in a geographic area, there is potential for a monopsony market power or buyer market power. The effect of this monopsony (wage-setting power) from an economic perspective is identical to the analysis of monopoly power in product markets.[13] Since the early 1980s, the link between productivity

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[1] The latest UN Development Report records that income inequality based on the top 10 percent's income share has risen since the 1980s. In 2017 the global top 1% owned more than 33% of the total wealth while the bottom 50% owned less than 2%. UN Human Development Report (2019:111, 132). We use the term economic inequality to refer to both wealth and income measures of inequality in contrast to opportunity inequality and other methods of estimations of social gaps, e.g mobility, wages and so on.

[2] Emmanuel Saez, *Income and wealth inequality: Evidence and policy implications*, 35 CONTEMPORARY ECONOMIC POLICY 7–25 (2017); Facundo Alvaredo, Anthony B. Atkinson & Salvatore Morelli, *Top wealth shares in the UK over more than a century*, 162 JOURNAL OF PUBLIC ECONOMICS 26–47 (2018).

[3] van Dorn, A., Cooney, R. E., & Sabin, M. L. (2020). COVID-19 exacerbating inequalities in the US. *Lancet (London, England)*, *395*(10232), 1243; According to the Institute for Policy Studies, between March 18 and Sept. 15, the total net worth of the USA billionaires rose from $2.95 trillion to $3.8 trillion. Gains of $141 billion a month, $32 billion a week, or $4.7 billion a day. From mid-March to mid-August, the collective work income of rank-and-file private-sector employees—all hours worked times the hourly wages of the entire bottom 82% of the workforce—declined by 4.4.%. See https://ips-dc.org/wp-content/uploads/2020/04/Billionaire-Bonanza-2020.pdf.

[4] JOSEPH E STIGLITZ, THE PRICE OF INEQUALITY: HOW TODAY'S DIVIDED SOCIETY ENDANGERS OUR FUTURE (2012); Sean F Ennis, Pedro Gonzaga & Chris Pike, *Inequality: A hidden cost of market power*, 35 OXFORD REVIEW OF ECONOMIC POLICY 518–549 (2019); Brian Nolan, Matteo Richiardi & Luis Valenzuela, *The Drivers of Inequality in Rich Countries* (2018).

[5] Lina M Khan & Sandeep Vaheesan, *Market power and inequality: The antitrust counterrevolution and its discontents*, 11 HARV. L. & POL'Y REV. 235, 245 (2017).

[6] Alan A Fisher & Robert H Lande, *Efficiency considerations in merger enforcement*, 71 CALIF REV 1580 (1983).

[7] Oliver E Williamson, *Economies as an antitrust defense: The welfare tradeoffs*, 58 AM. ECON. REV. 18, 27 (1968).

[8] WILLIAM J BAUMOL & DIETRICH FISCHER, SUPERFAIRNESS: APPLICATIONS AND THEORY 1 (1986).

[9] See John Creedy & Robert Dixon, *The relative burden of monopoly on households with different incomes*, 65 ECONOMICA 285–293 (1998); John Creedy & Robert Dixon, *Relative welfare losses and imperfect competition in New Zealand*, 34 N. Z. ECON. PAP. 269–286 (2000); Carlos M Urzúa, *Distributive and regional effects of monopoly power*, 22 ECON. MEX. NUEVA ÉPOCA 279–295 (2013); Martinez Licetti, Martha, et al., eds. *A Step Ahead: Competition Policy for Shared Prosperity and Inclusive Growth* OECD 21-23 (2017) (hereafter OECD 2017).

[10] Jerry Hausman & Ephraim Leibtag, *Consumer benefits from increased competition in shopping outlets: Measuring the effect of Wal-Mart*, 22 J. APPL. ECONOM. 1157–1177 (2007). The study estimated consumer benefits from competition (in the form of non-traditional hypermarket chains, e.g. Walmart) and find direct welfare gain, to be, on average, 4.8% due to the reduction in prices. The authors also found that households with income below $10,000 US benefit by approximately 50% more than the average household.

[11] Nolan et el., 2018: 17-18.

[12] Thomas Philippon, *Has the US finance industry become less efficient? On the theory and measurement of financial intermediation*, 105 AM. ECON. REV. 1408–38 (2015). ; Guillaume Bazot, *Financial consumption and the cost of finance: measuring financial efficiency in Europe (1950–2007)*, 16 J. EUR. ECON. ASSOC. 123–160 (2017).

[13] Suresh Naidu, Eric A Posner & Glen Weyl, *Antitrust remedies for labor market power*, 132 HARV REV 536 (2018).

growth (how much the individual worker produces) and real increases in wages appears to have declined.[14] This stagnation has been attributed to weakening competition in labour markets, taking the form of de-unionising the supply of labour,[15] and anticompetitive behaviour[16] and concentration[17] on the demand side (i.e., employers).[18] Low-skilled, workers are among the first to suffer from this wage suppression. Krueger and Ashenfelter, e.g., studied 156 large franchise companies in the United States and found that 58% of large franchisors' contracts (such as McDonald's, Burger King, and others), included covenants that restrict the employment and hiring of workers from other units within the same franchise chain.[19] In short, companies are sharing less of the gains than they used to.[20]

The paper hypothesises that the design, scope and enforcement of competition law might be associated with economic inequality. This hypothesis is no different than the notion that competition law should affect other macroeconomic factors.[21] Theoretically, competition laws are affecting market power, together with other policies and economic conditions. Any causal link is stemming from the competition in the markets, and it is interacting with other macro-economic trends and mostly economic growth. If we believe that competition policy may affect the GDP, for example, there is no reason a-priori reject the effect of the competition policy on inequality; both are a possible result of market power.
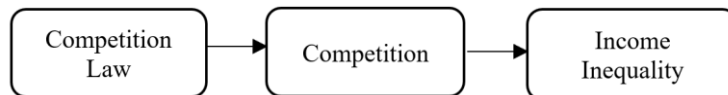
Stiglitz, Baker, and Salop[22] were among the first to argue that an increase in rents could be one of the reasons behind the increase in income and wealth inequality documented in the United States over the last forty years. These studies made a direct link between competition regulation ineffectiveness in scope and enforcement and these macroeconomic trends. However, the argument remained mostly theoretical. Van Reenen points to cartel enforcement to argue that Antitrust enforcement exhibit increasing trends and therefore are unconvincing as a possible cause for competition decline in the USA.[23] However, as we will explore next, looking only at cartel enforcement is potentially misleading, primarily when relying on selective quantitative methods exclusively.[24]

Our estimation strategy focusses on the paradigm's shift in the USA antitrust laws in the 70s-80s, using causal inference techniques. To apply the empirical analysis, we start by examining this shift in legal terms (doctrinal research) and descriptive data of enforcement efforts. Giving the extensive literature on antitrust and the Sherman Act,[25] we focus on three areas: 1. the Supreme Court, 2. enforcement agencies, and 3. substantive laws, where we believe the use of descriptive data adds to the legal debate. We follow the antimonopoly enforcement efforts (i.e., monopolisation or abuse of dominance) as a proxy for the paradigmatic shift. Antimonopoly norms and enforcement efforts are, to our understanding, the central area of law that has not been harmonised across countries over the years,[26] and the legal divide is still felt in the two sides of the Atlantic.

In this paper, we test this hypothesis by estimating whether a specific 'model' of competition law adopted in a country appears to be associated with higher or lower levels of inequality. We compare the USA and the European Union (EU) competition law models link to economic inequality and specifically to the top income shares. We find that countries with similar competition provisions (the letter of the law) to the USA tend to exhibit a higher level of

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[14] In Lawrence Mishel & Ross Eisenbrey, *How to Raise Wages: Policies That Work and Policies That Don't Inequality, Opportunity, and the Law of the Workplace Symposium*, 45 STETSON LAW REV. 43–68 (2015); Josh Bivens et al., *Raising America's pay*, 378 ECON. POLICY INST. BRIEF. PAP. (2014) ; JAMES UGUCCIONI, ANDREW SHARPE & ALEXANDER MURRAY, *Labour productivity and the distribution of real earnings in Canada, 1976 to 2014* (2016).

[15] See David Card, *The effect of unions on the structure of wages: A longitudinal analysis*, ECONOM. J. ECONOM. SOC. 957–979 (1996) ; Tali Kristal, *Good times, bad times: Postwar labor's share of national income in capitalist democracies*, 75 AM. SOCIOL. REV. 729–763 (2010) ;HENRY S FARBER ET AL., *Unions and inequality over the twentieth century: New evidence from survey data* (2018).

[16] CEA *Labor market monopsony: trends, consequences, and policy responses*, White House Council of Economics Advisors (2016), https://obamawhitehouse.archives.gov.

[17] JOSÉ A AZAR ET AL., *Concentration in US labor markets: Evidence from online vacancy data* (2018); EFRAIM BENMELECH, NITTAI BERGMAN & HYUNSEOB KIM, *Strong employers and weak employees: How does employer concentration affect wages?* (2018).

[18] See Sónia Félix & Pedro Portugal, *Labor Market Imperfections and the Firm's Wage Setting Policy* (2016); Douglas A Webber, *Firm market power and the earnings distribution*, 35 LABOUR ECON. 123, 124 (2015).

[19] See Alan Krueger & Orley Ashenfelter, *Theory and Evidence on Employer Collusion in the Franchise Sector* (2018), http://www.nber.org/papers/w24831.pdf (last visited Nov 9, 2018); The prevalence of different types of non-compete agreements was further identified in recent studies, see e.g., Evan Starr, James J Prescott & Norman Bishara, *Noncompetes in the US labor force*, U Mich. Law Econ Res. Pap. (2019).

[20] Brian Bell, Pawel Bukowski & Stephen Machin, *Rent sharing and inclusive growth* (2018): 25. Moreover, the authors find that the fall in rent sharing was more pronounced among the companies which enjoy monopolistic power.

[21] See for example, Mark A Dutz & Maria Vagliasindi, *Competition policy implementation in transition economies: An empirical assessment*, 44 EUR. ECON. REV. 762–772 (2000); Paolo Buccirossi et al., *Competition policy and productivity growth: An empirical assessment*, 95 Rev. Econ. Stat. 1324–1336 (2013); Jerg Gutmann & Stefan Voigt, *Lending a hand to the invisible hand? Assessing the effects of newly enacted competition laws*, Assess. Eff. New. Enacted Compet. Laws Febr. 8 2014 (2014).

[22] Stiglitz, 2012; Jonathan B. Baker & Steven C. Salop, *Antitrust, competition policy, and inequality*, 104 GEO LJ ONLINE 1 (2015).

[23] John Van Reenen, *Increasing differences between firms: market power and the macro-economy* (2018). See also Steven Berry, Martin Gaynor & Fiona Scott Morton, *Do Increasing Markups Matter? Lessons from Empirical Industrial Organization*, 33 J. ECON. PERSPECT. 44–68 (2019).

[24] Studying the EU context, Dierx et al., offer the only empirical observation on the relation between competition policy and distributional macroeconomic effects using actual policy data. The study found that liquidity-constrained households (less well-off individuals) increase their consumption proportionally more than non-liquidity-constrained households (four times more after five years), supporting the notion that competition law enforcement has a strong progressive effect. See OECD 2017, 160-163.

[25] *Nat'l Soc of Prof 'l Engineers v US* 435 US 679, 695 (1978); For a review of the USA antitrust see DOUGLAS F. BRODER, US ANTITRUST LAW AND ENFORCEMENT: A PRACTICE INTRODUCTION (2016)..

[26] Keith N Hylton, *Antitrust Enforcement Regimes: Fundamental Differences* 17-18 (2014).

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economic inequality. Our empirical estimation applies panel data techniques and a General Synthetic Control (GSC) method to test this hypothesis empirically. We take advantage of a new and extensive dataset on competition laws developed by Bradford & Chilton[27] and macroeconomic data gathered by the World Bank and the World Inequality Lab. Our results are likely a manifestation of similar links found between institutions and inequality.[28] Further studies are needed before any causal arguments and policy suggestions can be made.

The rest of the paper is organised as follows: In Section 2, we provide the basis for our hypothesis by looking into the macro-level changes in markups, inequality and the labour share in the USA. This section ties-in the link between competition and inequality in the USA. In Section 3, we look at the possible ideological shift in the antitrust laws. This part is mostly descriptive, focusing on quantifying the aspects of the antitrust paradigm. We analyse three main areas of the antitrust model: The Supreme Court, enforcement efforts and changes in the scope of the substantive norms. In Section 4, we summaries and explain our hypothesis concerning the antitrust model of law and why it should be associated with economic inequality. In section 5, we present the methods and data used in our empirical estimation. Section 6 presents our results from two models testing the link between the USA model of law and economic inequality, using panel data of OECD countries. Section 7 concludes. The appendix contains further information on the data statistics and additional sensitivity and robustness testing.

II. ECONOMIC INEQUALITY IN THE UNITED STATES

In this section, we provide the background for our hypothesis, looking at the macroeconomic trends in the United States. We observe three important trends: the rise in economic inequality and the decline of competition in the markets, and the decrease in labour share. The takeaway is that these trends seem parallel: the higher levels of observed inequality since the 1980s are associated with weak competition (higher markups) and a lower labour share.

In the last decades, researchers had devoted considerable attention to wealth and income inequality trends in the USA and other developed countries by leading scholars such as Piketty, Saez and Zucman.[29] They estimated that the share of overall wealth held by the top 1% has increased from 25% in 1980 to over 40% today. For the top 0.1%, it has grown from less than 10% to over 20% over the same period. The main policy issue that arises from their analysis is that top marginal tax rates are not progressive enough to account for the change in earnings. Figure 1 presents the share of income (left) and wealth (right) accumulated by the 1%, using the World Inequality Database (WID).

Figure 1: Income and wealth inequality trends in the USA

Source: WID for the USA

Saez argues that tax reduction associated with the Reagan period in the United States converted one of the most progressive tax systems in the post-World War II decades, to the least progressive after the 80s. The USA top tax rate dropped from around 70% to approximately 30% throughout the 70s to 85. Kuhn & Rios-Rull[30] show similar trends using the Survey of Consumer Finance (SCF) to compute the Gini coefficient for wealth and income inequality. The case presented by Saez, Zucman, and others is compelling in the case of the United States.[31] However, while the growing inequality gap is often attributed, by other as well, to poorly designed or skewed taxation or public

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[27] Anu Bradford & Adam S. Chilton, *Competition law around the world from 1889 to 2010: The competition law index*, 14 JOURNAL OF COMPETITION LAW & ECONOMICS 393–432 (2018).

[28] Robert E Hall & Charles I Jones, *Why do some countries produce so much more output per worker than others?*, 114 Q. J. ECON. 83–116 (1999); Alberto Chong & Mark Gradstein, *Inequality and institutions*, 89 REV. ECON. STAT. 454–465 (2007).

[29] Thomas Piketty studied the case of France in 2001 (Thomas Piketty, *Income inequality in France 1901-98* (2001). Shortly afterward, Piketty and Saez, studied the United States in 2003 (Thomas Piketty & Emmanuel Saez, *Income inequality in the United States, 1913–1998*, 118 Q. J. ECON. 1–41 (2003)). Emmanuel Saez & Gabriel Zucman, *Wealth Inequality in the United States since 1913: Evidence from Capitalized Income Tax Data*, 131 Q. J. ECON. 519–578 (2016). Since then, over 25 countries have been studied through a collective effort involving many researchers. See, for example, Facundo Alvaredo et al., *The top 1 percent in international and historical perspective*, 27 J. ECON. PERSPECT. 3–20 (2013)). The data are posted online in the World Wealth and Income Database (Facundo Alvaredo et al., *The world wealth and income database*, 2 WEBSITE HTTPWWW WID WORLD 11–75 (2016)), that is used in the next parts of the paper.

[30] Moritz Kuhn & José-Victor Rios-Rull, *2013 Update on the US earnings, income, and wealth distributional facts: A View from Macroeconomics*, 37 FED. RESERVE BANK MINNEAP. Q. REV. 2–73 (2016).

[31] JOACHIM HUBMER, PER KRUSELL & ANTHONY A. SMITH JR, *The historical evolution of the wealth distribution: A quantitative-theoretic investigation* (2016).

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expenditure policies, this does not seem to provide a full explanation for current trends. Inequality is increasing in many parts of the world, including those with vastly different taxation and expenditure regimes. Even in the case of the USA, in both *absolute* (the difference between the Gini score for pre-tax income and disposable post-tax income) and *relative* term redistribution (this difference divided by the Gini for pre-tax income and then multiplied by 100, that is, the percentage by which the pre-tax income Gini is reduced) devices are increasing or at least reasonably stable, as can be seen in figure 2. For the USA data, this provides a direct measure for the level of redistribution by tax and social security transfers.

Figure 2: Redistribution trends in the United States
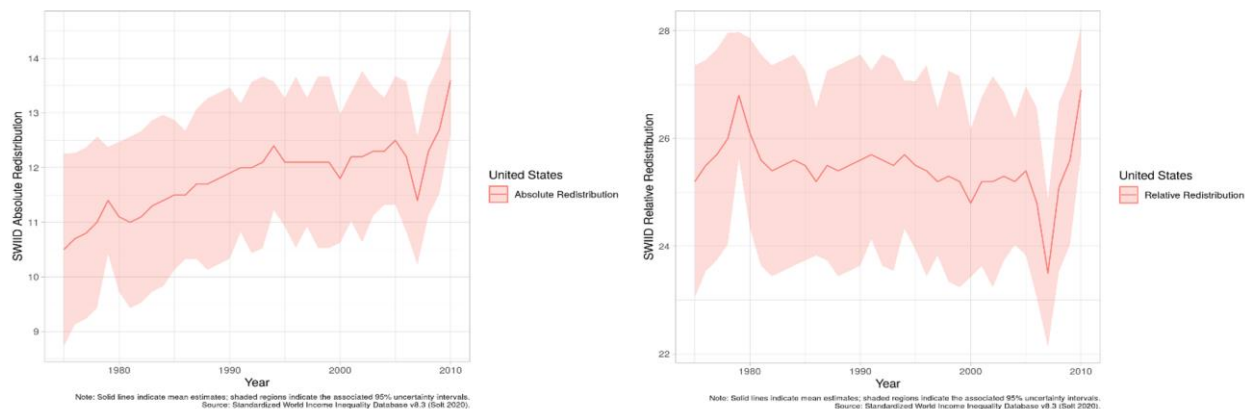
Source: SWIID data for the USA, https://fsolt.org/swiid/

We believe that a mix of policies and factors has contributed to the increase in wealth and income inequality in the USA, even if taxation policy is the leading explanation.[32] Specifically, a strong positive correlation between markups, as a measure for competition, and economic inequality was observed in the USA. In figure 3, we present the aggregated markups in the USA trend:

Figure 3: aggregated markups trends in the United States
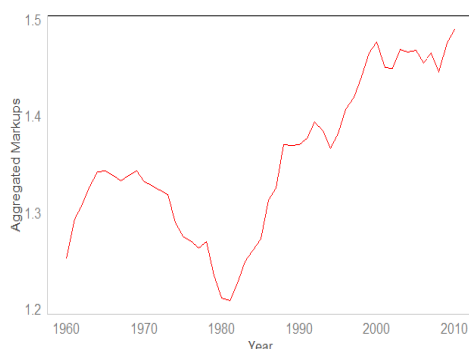
Source: De Locker et al., 2018

The similar trends of income and wealth inequality (figure 1) and the aggregated markups (figure 3) is prominent.[33] In a competitive environment, if firms try to raise their prices above their costs (markups) substantially, new companies would enter the market to compete, driving the markups back down. If such trends are happening across the board, rising aggregated markups, could be indicating a decrease in competition. It is tempting to use aggregated markups a measure for competition levels. Yet, they 'hide' massive heterogeneity. Moreover, changes in computing markups can yield different results.[34] Others measures for competition, such as concentration levels in the USA, support a similar trend,[35]yet a fierce discussion developed over the interpretation of these macro trends.

De Loecker and Eeckhout, connect the competition decline (the raise in markups) with the decline of both the labour and capital shares, as well as the reduction in low-skilled wages and other macroeconomic trends.[36]

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[32] Next to market power, increased wage inequality documented in the literature could also be affected by job polarization (Nir Jaimovich & Henry E. Siu, *Job polarization and jobless recoveries*, REV. ECON. STAT. 1–19 (2012)), or automation (Benjamin Moll, Lukasz Rachel & Pascual Restrepo, *Uneven growth: automation's impact on income and wealth inequality*, MANUSCR. PRINCET. UNIV. (2019)) as two main alternatives. We argue that Antitrust is yet another factor in this story.

[33] JAN DE LOECKER & JAN EECKHOUT, *The rise of market power and the macroeconomic implications* 47-48 (2017); JAN DE LOECKER & JAN EECKHOUT, *Global market power* (2018).

[34] James Traina, *Is aggregate market power increasing? production trends using financial statements*, PROD. TRENDS USING FINANC. STATEMENTS FEBR. 8 2018 (2018). Susanto Basu, *Are price-cost markups rising in the United States? a discussion of the evidence*, 33 J. ECON. PERSPECT. 3–22 (2019). The question of the correct and valid metric for market competitiveness is outside the scope of this paper.

[35] Gustavo Grullon, Yelena Larkin & Roni Michaely, *Are US industries becoming more concentrated?*, 23 REV. FINANCE 697–743 (2019).

[36] DE LOECKER AND EECKHOUT 2017, 47:48; See also Matthew Rognlie, *Deciphering the fall and rise in the net capital share: accumulation or scarcity?*, 2015 BROOK. PAP. ECON. ACT. 1–69 (2016); Simcha Barkai, *Declining labor and capital shares*, 2 STIGLER CENT. STUDY ECON. STATE

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Increased capital and labour income dispersions between earners at different levels of the overall income distribution are concentrating wealth at the very top. Low-skilled workers are losing out to CEO and marketing managers, receiving less income from the distribution pie. Similar econometric evidence suggests that the decline in labour share is linked with a firm's market power and automation (increasing use of automatic manufacturing systems) in the last 20 and more years.[37]

Other researchers argue for a different economic narrative claiming that the decline in labour shares are the result of faster innovation of 'superstar' firms like Google or Amazon leading the way.[38] Autor et al., suggested the monopolistic competition ('winner take most' type), causes the labour share decline, while the capital share is not declining as argued. Significant cross-sectional heterogeneity (not necessarily constant), even within narrowly defined industries, suggests that aggregated macro-estimations could be misleading. For example, Song[39] uses the USA Social Security Administration data, which is close to the actual population data, looking at the same workers over time. This study finds that much of income inequality can be explained by 'between firm' differences (contesting the notion of high vs low paid workers within firms increase). Under this view, the main effect of competition on economic inequality is associated with the capital share vs labour share decline and between firm labour dispersion. Labour income is more evenly distributed across households than capital income, while the latter tends to be more concentrated at the top income households.[40] Hence, a decrease in the labour share - and equivalently an increase in the capital share - makes overall income less evenly distributed and more concentrated at the top of the income distribution. Empirical work on the association between capital share and economic inequality found some support for this link. Moreover, workers at the superstar firms are both producing and sharing in those super-normal returns, driving up wage inequality. Lastly, the high returns to labour and capital at those firms reduce labour mobility by discouraging workers from leaving firms that earn higher rents.[41] Overall, empirical results seem to be inconclusive,[42] but the evidence seems to be robust enough to question the role of antitrust and competition laws.

III. THE ANTITRUST MODEL

In this section, we describe three aspects of the antitrust law model. Given the extensive literature on antitrust laws goals and the so-called 'Chicago School' paradigmatic shift in the 70s-80s in the USA,[43] we focus on three areas of the model that could be quantified using available metrics: A. The role of courts and particularly the Supreme Court. B. Enforcement efforts C. The Substantive antitrust laws.

A. The role of the Supreme Court

An outstanding amount of research has devoted by legal scholars regarding the strong link between antitrust laws movement and the Supreme court paradigmatic shift.[44] A different challenge is to estimate the institutional drift of the Supreme Court and the turning point in the antitrust movement. Ramsey et al. argue for paradigmatic shift accruing in the late 70s to the middle of the 80s.[45] Pollock, for example, emphasises the five antitrust supreme court cases in

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NEW WORK. PAP. SER. (2016). Barkai argues that labour share and capital share are actually declining together using profit rates as a third option to estimate market power. The only macroeconomic factor which is going up significantly, according to Barkai, is the profit share, with profits rising more than six-fold: from 2.2% of GDP in 1984 to 15.7% in 2014 (p. 16).

[37] Drago Bergholt, Francesco Furlanetto & Nicolo Faccioli, *The Decline of the Labor Share: New Empirical Evidence."* (2019). The authors suggest that markups (as a proxy for market power), have significant explanatory power for the decline of labour share. Changes in the bargaining power of workers have some relevance for short-run fluctuations only (18-19).

[38] H David et al., *The fall of the labor share and the rise of superstar firms* (2017) argues that globalisation (workers are losing out to their counterparts in places like China and India) and technological changes (workers are losing out to robots) benefit the most productive firms in each industry. Product market concentration rises as industries become increasingly dominated by 'superstar' firms with high profits and a low share of labour in firm value-added and sales. They suggest that, as the importance of superstar firms increases, the aggregate labour share tends to fall. They suggest the previous work, including Barkai (2016), analysis industry-level data and a smaller time-series and is therefore complementary to their results. A similar conclusion was reached by Kurz focusing on the IT industry (Mordecai Kurz, *On the formation of capital and wealth*, STANF. INST. ECON. POLICY RES. SIEPR WORK. PAP. (2017).

[39] Jae Song et al., *Firming up inequality*, 134 Q. J. ECON. 1–50 (2019). Still some argue that this between firm ineqaulites are resulting from industry level effects. See JOHN C. HALTIWANGER & JAMES R. SPLETZER, *Between Firm Changes in Earnings Inequality: The Dominant Role of Industry Effects* (2020).

[40] see Margaret Jacobson & Filippo Occhino, *Labor's declining share of income and rising inequality*, ECON. COMMENT. (2012).

[41] Jason Furman & Peter Orszag, *A firm-level perspective on the role of rents in the rise in inequality*, 16 PRESENT. "A JUST SOC. CENTEN. EVENT HONOR JOSEPH STIGLITZ COLUMBIA UNIV. (2015);

[42] Ben Lipsius, *Labor Market Concentration Does Not Explain the Falling Labor Share*, AVAILABLE SSRN 3279007 (2018); Kevin Rinz, *Labor market concentration, earnings inequality, and earnings mobility*, 10 CENT. ADM. REC. RES. APPL. WORK. PAP. (2018). GILBERT CETTE, LORRAINE KOEHL & THOMAS PHILIPPON, *Labor shares in some advanced economies* (2019).

[43] Herbert J Hovenkamp, *Federal antitrust policy: the law of competition and its practice* 50-51 (2005); Robert H Bork, *Legislative intent and the policy of the Sherman Act*, 9 J. LAW ECON. 7–48 (1966); Yale Brozen, *Competition, Efficiency and Antitrust'(1969)*, 3 J WORLD TRADE L 65; Posner, 1978: 925); Louis B Schwartz, *Justice and other non-economic goals of antitrust*, 127 U PA REV 1076 (1978); George J Stigler, *The origin of the Sherman Act*, 14 J. LEG. STUD. 1–12 (1985); Eleanor M Fox & Lawrence A Sullivan, *Antitrust--Retrospective and Prospective: Where Are We Coming from--Where Are We Going*, 62 NYUL REV 936 (1987); Robert H Lande, *Wealth transfers as the original and primary concern of antitrust: The efficiency interpretation challenged*, 34 HASTINGS LJ 65 (1982).

[44] "since passage of the Sherman Act in 1890, the courts, and most importantly the Supreme Court, have played an extremely significant role in regulating the national economy and ensuring the continuation of competition through their interpretation of the antitrust statutes". Ramsey, 2012:1,6.

[45] ibid, 141.

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76 as the milestone.[46] The latest reference we found marks Bork's Supreme Court nomination (1987) as the 'capture of the court' by the new antitrust movement.[47]

 If and when the Supreme Court has gone through an ideological shift, it could be relevant to the willingness of the institution to engage in the distributional aspects of antitrust law. Even more likely, the Supreme Court would be more comfortable with potentially less intense competition regulation under a 'laissez-faire' approach. We try to follow the quantitative descriptive analysis of the USA Supreme Court's political shift. Using measure for a relative location of USA Supreme Court justices on an ideological continuum allows for a better understanding of the politics of the high Court using empirical methods. The score measures the judicial ideology over the years and gives specific values to each justice, the median justice, the most right (conservative), and left (progressive) justice serving at that year. For example, the high value represents a very conservative justice (+4) while a low or negative value is for a progressive justice (-4). A probability model using Bayesian Inference allows for judicial ideology to trend smoothly through time. This modelling approach enables the estimation of other quantities of interest, such as locating the pivotal "median" justice, as all well the location of each case in the policy space.[48] Looking at all the time-series observations of the median, min (most progressive justice as shown in figure 4 on the left) and max (most conservative justice on the right), shows an apparent increase that starts before the 70s (min) or by the end of the 70s (max) and remains high ever since.

Figure 4: Supreme Court ideological continuum in the USA
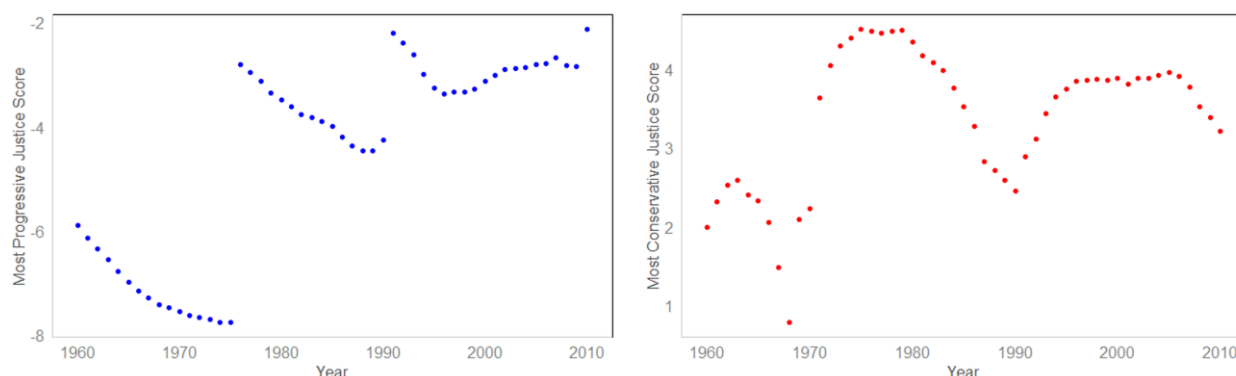
The most progressive score (represented by negative values) has shifted from shallow values (-8) in the mid-70s, to almost neutral values (-2) in the middle of the 90s. The peak is at 2010. This shift shows that progressive justices have become 'less' progressive. The Martin-Quinn score seems to reflect the commentators and case law reviewed above. The most conservative justice scores show a similar increasing trend going from just above a zero score to the highest score measured (+5) in the years before 1980, keeping a high score from most of the 1980s-2000s.[49]Under our hypothesis, the ideological shift of the Supreme Court could lead to a chilling effect on enforcement (private and public), leading eventually to less intensive competition and macroeconomic results.

B. The role enforcement agencies

The enforcement agencies have a substantial impact on antitrust laws as well, prioritising resources, implementing the legislation through the guidelines,[50] and public prosecution powers. The federal and state enforcement agencies do not have the full authority to enforce antitrust infringements or block mergers and must obtain a court ruling (as opposed to their European colleagues). Again, giving the courts the final ruling on the shaping of the regulation model.

 Similar to the paradigmatic shift apparent in the Supreme Court, government agencies' enforcement activity was not monotonous as well. The DOJ and the FTC enforcement efforts seem to fall around the end of the 70s. One might add that the mere dual structure of the USA agencies is "inelegant, redundant, and often problematic."[51] The mainstream consensus regarding antitrust, federal enforcement efforts in the United States, has been relatively stable (low) since the end of the 70s early 80s when the winds of change with Clinton and Obama presidencies turned out to be "more talk than action."[52] The public enforcement pendulum in the United States has swung from the activist

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[46] Earl E. Pollock, *Antitrust, the Supreme Court, and the Spirit of '76*, 72 NW UL REV 631 (1977).

[47] "Chicago's fondest dream has now been realized: There's at last a Reagan-Chicago Court in command of federal antitrust policy, with the power to direct it where it will […]". Foreword, Antitrust L. & Econ. Rev. (1) 1987.

[48] Andrew D Martin & Kevin M Quinn, *Dynamic ideal point estimation via Markov chain Monte Carlo for the US Supreme Court, 1953–1999*, 10 POLIT. ANAL. 134–153 (2002);

[49] For more information see: http://mqscores.lsa.umich.edu/index.php.

[50] U.S. Dep't of Justice & Federal Trade Comm'n, Horizontal Merger Guidelines § 1 (2010): https://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf

[51] Daniel A Crane, *The institutional structure of antitrust enforcement* 28, 42-48 (2011).

[52] Broder, 2016: 10.

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antitrust enforcement of the mid-to-late 1970s[53] with unspecified goals[54] to the precautionary refinement of economic analysis of the Chicago School and the following moderate enforcement efforts, in the age of efficiency concerns.[55] Khan, e.g., makes the direct (theoretical) link between today's market concentration levels and the pendulum of enforcement.[56] Comparisons of enforcement efforts between regimes could prove misleading as agencies tend to report different measures, reflecting both differences in substantive law and strategy of enforcement.[57] Ghosal tried to capture the pragmatic shift using statistics of enforcement activities of the USA federal agencies.[58] He finds a distinct regime shift in antitrust enforcement during the 1970s. This conclusion relies on a compositional change of enforcement efforts; A large increase in criminal antitrust court cases, alongside a decrease in civil antitrust court cases. Even more impressive is the clear decreasing trend apparent when disaggregating the civil cases as in figures 5. Ghosal does not assume a break-point but instead uses econometric techniques to reveal the date of the structural change.[59] For both the aggregated civil cases and the Sherman Act, section 2 – 1972 is the estimated time point. The latest estimation in the study is for the civil Sherman Act section 1 – 1981, and all the rest are within the 70s period.[60]

Figure 5. left side (a) Total merger cases. (b) Total U.S. mergers. (c) Ratio; *right side* (a) Sherman Act section 1 (restraints of trade) (b) Sherman Act section 2 (monopolization) cases
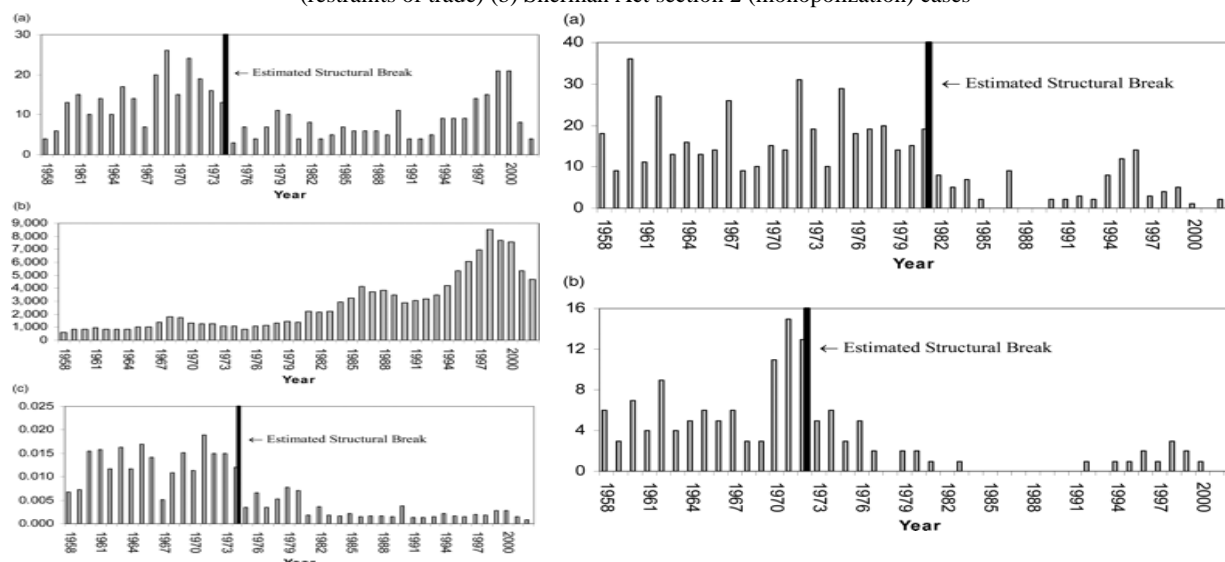
Source: *Journal of Competition Law & Economics*, Volume 7, Issue 4, December 2011, Pages 733–774, https://doi.org/10.1093/joclec/nhr016

Theoretically, the USA public enforcement is unique in its inclusion of criminal penalties (exclusive responsibility of the DOJ) in the regulation. In practice, however, the federal enforcement agencies do not prosecute all antitrust violations as criminal offences, except for 'hardcore' cartel activity, such as price-fixing.[61] The limited extend of the criminal procedure is mostly due to the Supreme Court's ruling that the DOJ must prove criminal intent for conviction.[62] The few studies that investigated the state-level antitrust enforcement did not find a parallel increase in cases that could balance the Federal level trend.[63] Some argued that the paradigmatic shift was part of the reasons state enforcement was initiated in the first place.[64] Based on our hypothesis, less active enforcement leads to less intense competition, which can lead to higher levels of inequality.

C. Substantive rules

Lastly, the substantive rules governing monopolisation in the USA had become a rigorous and challenging hurdle for antitrust enforcers. Taking the example of predatory pricing as an example, the USA Supreme Court has ruled that

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[53] James May, *Antitrust Practice and Procedure in the Formative Era: The Constitutional and Conceptual Reach of State Antitrust Law, 1880-1918*, 135 UNIV. PA. LAW REV. 495–593 (1987) ; James May, *Antitrust in the Formative Era: Political and Economic Theory in Constitutional and Antitrust Analysis, 1880-1918*, 50 OHIO ST LJ 257 (1989) ;William E Kovacic, *The modern evolution of US competition policy enforcement norms*, 71 ANTITRUST LJ 377 (2003).

[54] B Dan Wood & James E Anderson, *The politics of US antitrust regulation*, AM. J. POLIT. SCI. 1–39 (1993); Hovenkamp, 2005: 69; Broder, 2016: 7.

[55] Wood & Anderson, 1993; Hovenkamp, 2005: 64-65, 69.

[56] "Highly concentrated markets in the contemporary United States are not the product of impersonal economic forces-rather they are the product of conscious legal and political decisions in the late 1970s and early 1980s." See Khan, 2017: 268.

[57] Anu Bradford & Adam S Chilton, *Trade openness and antitrust law*, 62 J. LAW ECON. 29–65 (2019).

[58] Vivek Ghosal, *Regime shift in antitrust laws, economics, and enforcement*, 7 J. COMPET. LAW ECON. 733–774 (2011). Available at: https://doi.org/10.1093/joclec/nhr016

[59] ibid, 751-752.

[60] ibid, 753.

[61] Broder, 2016: 184-185. In 2017, the DOJ opened 44 criminal investigations (25 grand jury investigations and 19 preliminary inquiries). The Division filed 24 criminal cases, charging 8 corporations and 27 individuals. The Division obtained $66 million in criminal fines and penalties from 7 corporations and 34 individuals. The courts sentenced 30 individuals to serve time in jail with an average of nearly 9 months incarceration, filed 67 criminal cases and obtained $1.14 billion in fines. Courts imposed 45 prison terms with an average sentence of just over two years. See US report to the OECD June 2018, https://one.oecd.org/document/DAF/COMP/AR(2018)18/en/pdf.

[62] *United States v U.S Gypsum Co*. 438 U.S 422 (1978).

[63] Robert M Feinberg & Kara M Reynolds, *The determinants of state-level antitrust activity*, 37 REV. IND. ORGAN. 179–196 (2010).

[64] Jonathan Rose, *State antitrust enforcement, mergers, and politics*, 41 WAYNE REV 71 (1994).

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predatory pricing (and refusal-to-deal) should be subject to more relaxed standards. These standards followed the spirit of the rule of reason-open-ended tests, raising the burden laid on the plaintiffs to prove an anticompetitive claim. The courts ruled that predatory pricing is "rarely tried, and even more rarely successful."[65]

Predatory pricing claims in the United States fall under Section 2 of the Sherman Act. The law under Section 2 puts high hurdles in the way of predation plaintiffs. The predatory pricing doctrine in the USA antitrust regime requires the plaintiff to prove below-cost pricing using a reasonable proxy for the marginal cost (MC). The choice of marginal cost is one of at least three options possible: marginal cost, the average cost (AV), and average variable cost (AVC), and reflects the scepticism inherited the regime. The USA standard for predatory pricing is the efficient standard is it concludes that only pricing that reduces total welfare can potentially breach antitrust law.[66] However, the marginal cost is nearly impossible to measure precisely. Therefore, the USA courts examine reasonable proxies to marginal cost,[67] when the goal of the doctrine (and the plaintiff) is to approximate marginal cost.[68]

The standard must be proved at an early stage of the claim, to avoid summary judgment in a predation lawsuit. The plaintiff is also required to prove that the defendant can recoup its losses from the successful predation campaign.[69] These changes are based on open-ended, fact-intensive legal standards.[70] Needless to explain, both requirements are challenging to meet in practice.[71] The report suggests that predatory pricing law should be modified, and the overall burden of proof on plaintiffs reduced.[72] Exploring, the Competition Law Index (CLI) of Bradford and Chilton,[73] which measures the scope of the law, the United States trends related 'monopolisation' or 'abuse of dominance' are apparent as well. On the left side, the CLI world data, averaged by geographical region. On the right side, the flat USA section 2 norm.

Figure 6: Antimonopoly norm, 1960-2010
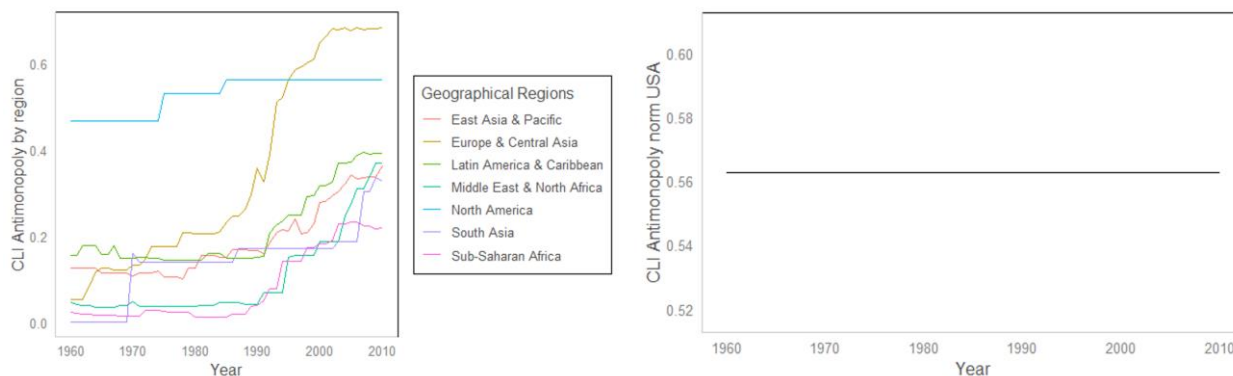
The stagnation in the USA could not be more obvious. The EU and Central Asia competition laws also closed the initial gap with the USA around the 90s. The overall paradigmatic shift is particularly apparent in section 2 of the Sherman Act enforcement, which requires complex economic and legal analysis. As can be seen in figure 7, the number of monopolisation cases comes to a complete stop in the early 70s in the USA. In contrast, the number of abuse of dominance cases in the EU shows significant volatility.[74] Again, be it a result of appetite or substantive laws, the bottom line is the same.

Figure 7: Antimonopoly Enforcement, USA vs EU

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[65] *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 589.

[66] Phillip Areeda & Donald F. Turner, *Predatory pricing and related practices under Section 2 of the Sherman Act*, 6 J REPR. ANTITRUST ECON 701-702 (1975). The reason is that price, under ideal conditions, reflects the marginal benefit to society from producing an extra unit of a good. Marginal cost, under ideal conditions, reflects the resource cost to society of supplying an additional unit of a good to the market.

[67] *Brooke Group Ltd. v. Brown Williamson Tobacco Corp.*, 223.

[68] *United States v. AMR Corp.*, 1115-1116.

[69] *Brooke Group Ltd. v. Brown Williamson Tobacco Corp.*, 222-224.

[70] The US Supreme Court has held – with rulings in many different areas of competition regulation – that the rule of reason is the default legal standard. See Khan, 2017: 272-274.

[71] Stigler Center Committee on Digital Platforms Report 76 (2019) https://research.chicagobooth.edu/stigler/events/single-events/antitrust-competition-conference/digital-platforms-committee.

[72] Under EU law, unlawful predation is established if the evidence shows that the defendant sets its price below average variable cost (Case 62/86, *AKZO Chemie BV v. Commission* [1991] ECR 3359 para. 71). If the defendant set its price below average cost (AC) but above average variable cost, then predation can be established if the evidence suggests that it was accompanied by an intention to exclude the plaintiff (*AKZO Chemie BV v. Commission*: para. 72).

[73] Anu Bradford & Adam S Chilton, *Competition Law Around the World from 1889 to 2010: The Competition Law Index*, 14 J. COMPET. LAW ECON. 393–432 (2018). See section III.A of the empirical estimations next for more details.

[74] This does not mean that antitrust enforcement has stopped completely. We interpret these figures as a change in focus towards more personal and criminal enforcement act, mostly against cartels (section I). See Germán Gutiérrez & Thomas Philippon, *How European Markets Became Free: A Study of Institutional Drift*.

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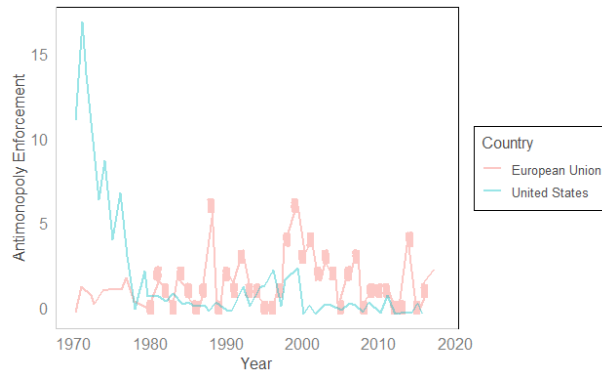
Source: data from Gutiérrez and Philippon, 2018: 28; which is an extended dataset of Francesco Russo et al., European commission decisions on competition: economic perspectives on landmark antitrust and merger cases (2010).

We expect that such a shift can explain a reduce in both ex-post and deterrent effects of the antitrust policy in the USA.[75] When the number of cases drops to zero for several years, companies can perceive this as a signal: the priorities have changed. On the other hand, when enforcement goes up and down, some level of uncertainty, which is essential for enforcement efforts, remains.

D. Summary: an antitrust scale and markups

To quantify the antitrust model, and support the notion that a paradigmatic shift has occurred in the USA, we created a new scale which takes into account all three pillars discussed above.[76] Simply put, we scaled the three factors of the competition regulation reviewed: The Supreme Court (the negative of the min score), enforcement efforts (the number of antimonopoly cases) and the substantive law (the CLI overall scope measure). All three were scaled to have a zero average and a standard deviation of 1. We gave each score equal weights and plotted from 1970 through 2010.[77] Figure 8 presents the results. The mean of the new scale is ~0.075 (due to NA's), with a minimum value of -0.32 and max of 1.446.
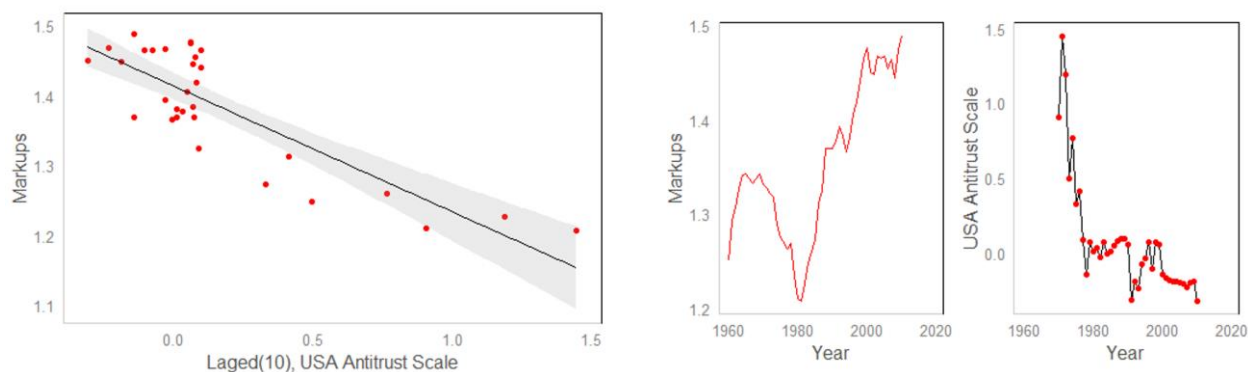
Figure 8: USA Antitrust scale
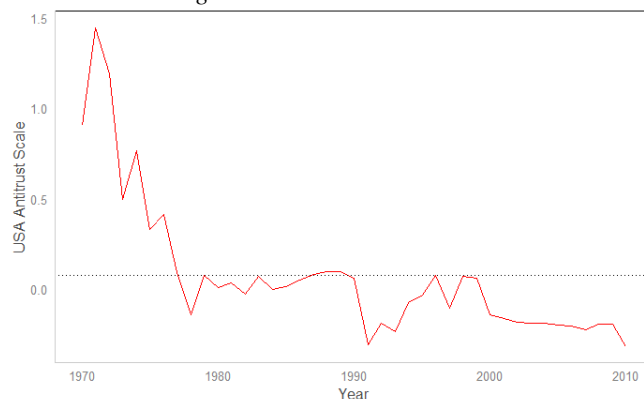
As can be seen in figure 8, the antitrust model has been on a consistent downward trend. The antitrust scale is below-average scores since the end of the 70s, which can affect the level of competition. In figure 9, we contrast the Antitrust scale with the rise of markups as a proxy for competition levels in the USA economy.

Figure 9: USA Antitrust scale and markups

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[75] The theory of optimal antitrust enforcement is traceable to Gary Becker's article on the economics of punishment. The law and economic literature had argued that optimal incentives of enforcement are best achieved when social costs associated with offensive (anticompetitive in this case) conduct are fully internalised. Landes provided a more detailed application of Becker's analysis to antitrust. In the antitrust context, internalisation requires the punishment authority to shift the costs suffered by consumers, in terms of monopolistic overcharges or restrictions in supply, to the monopolizing firm in the form of a penalty (monopolistic is used here as any form of market power). This analysis allows to consider efficiency gains resulting from a firm's anticompetitive action. If there is no efficiency gain, then the optimal policy would set the penalty in order to completely deter the violator's conduct. As reviewed here, when the enforcement efforts are dropped almost to a complete stop, the prediction of the model is clear. See William M. Landes, *Optimal Sanctions for Antitrust Violations*, 50 UNIV. CHIC. LAW REV. 652 (1983).

[76] For a similar method see: Buccirossi et al., 2013. The CPI index is unfortunately only available for 12 countries and 10 years (1995-2005).

[77] Giving that we had no theoretical foundation to assume and differences, we averaged the three indexes together (x*1/3+y*1/3+z*1/3).

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On the right side, markups and the USA antitrust scale over 1960-2010. The drop in the 70s is preceding the rise of markups in 1980s, and the scale is stagnated ever since. On the left side, figure 9 presents a linear regression of lag(10) of the antitrust scale and markups. In other words, we expect a long-term correlation between antitrust institutions and performance in the markets. In this simple correlation, the link between the low (high) scores of the antitrust scale and high (low) markups is apparent. However, the low number of observations, level of aggregation, and the lack of counterfactual analysis do not allow for causal inference. We, therefore, run only a benchmark econometric model to check the robustness of this simple correlation. We find a robust negative correlation between our new scale and the rise of markups in the USA. The R-squared is high for all four models, supporting a good fit. The controls for business cycles show the expected correlation when the growth in GDP is positively correlated with markups, and inflation is negatively correlated. In the appendix, you can find the full results with controls, and further analysis on USA time-series linking the rise in markups to top income shares. These two basic models are a sanity check for our hypothesis. We show that the theoretical mechanism we offer holds in both levels: Antitrust and markups (Tables 1, A7),[78] and markups and economic inequality in the USA (Tables A2-A4).

Table 1. Antitrust paradigmatic shift and aggregated markups the USA

	(1)	(2)	(3)	(4)	(5)
	markups				
lag(Antirust, 10)	-0.135***	-0.019**	-0.017	-0.020*	
	(0.014)	(0.009)	(0.012)	(0.010)	
Antitrust Moving Average					-0.163**
					(0.054)
lag 1(markups)		0.862***	0.767***	0.490***	0.453**
		(0.056)	(0.076)	(0.133)	(0.159)
lag 2 (markups)				0.242**	0.109
				(0.114)	(0.163)
Obs.	31	31	26	26	23
R-squared	0.722	0.966	0.987	0.988	0.993
Controls	NO	NO	YES	YES	YES

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

These results are in line with Ghosal, and the new literature on the rise of markups.[79] For the purpose of our estimation strategy, we use this correlation to identify two enforcement periods: pre-72 and post-72 and to base our hypothesis on the USA model, as we explain next.

IV. HYPOTHESIS: MODEL OF LAW, COMPETITION AND INEQUALITY

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[78] The model is a simple log-log linear regression using five controls for the business cycle, investment levels and technology advances: log_infla, log_gdp_pcg, log_fdi_in, log_fdi_out, log_GC_F, log_TPC_GDP. The lag 10 of the antitrust scale was chosen as long-run relationship based on the literature of competition law impact assessments. See Fiammetta Gordon & David Squires, *The Deterrent Effect of UK Competition Enforcement*, 156 ECON. 411–432 (2008); S. W. Davies & P. L. Ormosi, *A COMPARATIVE ASSESSMENT OF METHODOLOGIES USED TO EVALUATE COMPETITION POLICY*, 8 J. COMPET. LAW ECON. 784 (2012) ; Rob J. M. Alessie et al., *Impact Assessment of Competition Policies and Regulation: 10 Years' Experience from the Office of the Chief Economist in the Netherlands*, 166 ECON. 1–6 (2018). It is common to assume 2 years effect for an individual decision (in merger analysis for example), so modelling the effect of the whole system as a 10 years lag seems conservative. As a sensitivity test, we also run the same model using a moving average of 10 years of the antitrust scale to create a smooth process of transformation (column 5). Results are negative and statistically significant. We also re-run all 5 models using a lag 5 of the antitrust scale. Results were negative but statistically insignificant for column 4-5. All variables are presented in Table A1 of the appendix, and the full results are in Table A7. Additional econometric tests (multicollinearity, heteroscedasticity) can be found in the replication appendix.

[79] Ghosal, 2011; Gutiérrez and Philippon, 2020.

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The strategy of enforcement in the USA model emerges from the system features and institutions rather than just a conclusive resolution of intellectual debate. The USA model is as an adversarial, Supreme Court cantered[80] competition law; public enforcement efforts focus on cartels (section I), and private actions are strongly incentivised.[81] These characteristics of regulation are expected as a whole to affect the way competition laws are associated with economic inequality. Moreover, the USA antitrust model can be a proxy to test out the appetite for enforcement and ideological differences between the regulators. In other words, the model of law choice integrates the institutions, priorities and strategy of enforcement of the regulation as a whole. Using similarity to a model law also has key advantages over leximetric data which tries to quantify one aspect of the law and can be criticised by endogeneity issues or due to it been legally too narrowed.

The remaining part of the paper will include our empirical estimations of the link between the antitrust model, adapted by other countries, and economic inequality. We hypothesis that *the USA model of competition law should be associated with a higher level of economic inequality comparing to the EU model*. Countries that resemble the USA model (post-shift) like New-Zealand and Japan, for example, are expected to be associated with higher economic inequality, all other things equal. The contrast, is in most cases the EU model of law, with its public administrative focus. It is a form of 'path-dependent change', initial conditions determine both the subsequent trajectories of institutions and how they evolve and influence the institution structure and strategy.[82]

The decision to focus on these two specific models of competition law, The USA and EU, requires further scrutinising. These two models are, without a doubt, the actual 'model laws'[83] encouraging the adaptions of dozens on new competition laws all over the world in the last two decades.[84]The theoretical literature of comparative competition law – based on the optimal enforcement models of Becker (theory of punishment effects) and later Landes with the antitrust model,[85] implies that the optimal antitrust enforcement policy internalises, to the monopolising firm, the harm suffered by consumers. One way to reach optimal deterrence, according to Landes' model is to *internalise consumer harm*, but another is to *eliminate the expected profits* from the anticompetitive conduct in hope to deter the behaviour altogether.[86]According to Blair and Sokol, the two option are manifested in the two models of law: Antitrust (consume harm) and the EU (complete deterrence).[87] Some aspects of the theoretical model could also reflect a 'public welfare' mechanism.[88] In other words, the competition law model choices (i.e. legal standard of abuse of dominance) could incorporate social goals even if formally, they are not specified directly in the Sherman Act or the EU regulation.[89] These two models also seem to reflect, a slightly different context of decision making in competition regulation.[90] It is even safe to say that these two models reflect competing philosophies for economic regulations.[91]

Exploring the links between the model of law and economic inequality could, therefore, shed light on the legal mechanisms fused in the laws that purposefully or un-purposefully can have distributional effects. Two assumptions underling our hypothesis: 1. The USA and the EU model of law are distinct forms of competition regulations. 2. The differences reflected in the two models could have implications for the degree of inequality.

V. METHODS AND SPECIFICATIONS

We base our estimation strategy on textual similarity to antitrust laws. In other words, we test the hypothesis that the USA style antitrust will be associated with higher levels of economic inequality by looking at laws that copy the wording of the Sherman Act. The difference-in-difference (DID) panel data, is based on the binary treatment – similarity to the antitrust law,[92] following regression equation:

$$\log (Y_{i,t}) = \alpha_i + \beta_t + \log (Y)_{i,t-1} + \delta resemb\_us_{i,t} + \log (X'_{i,t}) + v_{i,t}$$

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[80] Khan, 2017: 2.

[81] Robert H Lande & Joshua P Davis, *Benefits from private antitrust enforcement: an analysis of forty cases*, 42 USFL Rev 879, 906 (2007); Hylton 2003: 48-49.

[82] Daron Acemoglu, Georgy Egorov & Konstantin Sonin, *Institutional Change and Institutional Persistence*, Univ. Chic. Becker Friedman Inst. Econ. Work. Pap. (2020).

[83] "In spite of the large number of antitrust enforcement regimes, there are three that are recognized as extremely important in global commerce: the United States, the EU, and China. Moreover, China has modelled its antitrust law regime on that of the EU. Given this, there are essentially two antitrust regime types that dominate global commerce: the United States and the EU". 2 Roger D Blair & D Daniel Sokol, The Oxford Handbook of International Antitrust Economics 17:18 (2015).

[84] Mattia Guidi, Competition Policy Enforcement in EU Member States (2016).

[85] Gary S. Becker, *Crime and punishment: An economic approach*, *in* The economic dimensions of crime 13–68 (1968).; Landes, 1983.

[86] See Blair & Sokol, 19:20.

[87] ibid, 21:22.

[88] ibid, 27.

[89] The European Union does make reference to the value of fairness, target unfair pricing and trading conditions, and can be applied and developed in the light of wider policy concerns such as social and consumer protection.

[90] Eleanor M Fox, *US and EU competition law: A comparison*, Glob. Compet. Policy 339-340 (1997).

[91] Peter A Hall & David Soskice, Varieties of capitalism: The institutional foundations of comparative advantage (2001);Ariel Ezrachi, *Sponge*, 5 J. Antitrust Enforc. 49–75 (2017). See also lasted conflicts arising from the differences in analysing the drivers of competition in digital economy – platforms such as Google, Facebook and Amazon – and the perceived economic, social, and political risks posed by their dominant position and perceived risks associated with enforcement efforts. Ariel Ezrachi, *EU Competition Law Goals and the Digital Economy*, SSRN Electron. J. (2018), https://www.ssrn.com/abstract=3191766; US Congressional Research Service. 2019. "Antitrust and 'Big Tech'" Washington, DC, September: 1.

[92] We do not report the similarity to EU results for obvious reasons, as it is easier to find and effect steaming from the lower levels of inequality (despite high levels of heterogeneity) apparent in the EU countries (but the results are as expected).

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The cross-country panel data enables as to link the 'model of law', using the text of the law, with economic inequality. It covers the post-transformation antitrust period 1990 until the pre-crisis period of 2010, to avoid additional endogeneity issues. It includes a min of 32 countries from the OECD group, depending on the availability of the data. To check the robustness of our estimation, we also include a dynamic Generalised Method of Moments (system GMM) model in the appendix.[93] However, GMM models are best suited for a dataset with many units panel (N) and few periods (T); thus, we prefer to rely on the GSC as explained next.[94]

All panel data DID models are based on the parallel trend assumption of the countries selected for comparison, i.e., in the absence of the treatment, the average outcomes of treated and control units would have followed parallel paths. This assumption is not directly testable, but researchers have more confidence in its validity when they limit the sample to homogenous in terms of economic development countries like the OECD (compared to the World dataset). The DID and GMM models are also more easily manipulated by the researcher's specification and choices (e.g. choice of controls). For this reason, we implemented a General Synthetic Control (GSC) method that could use the dataset of OECD countries to design an optimal control group.

Abadie and Gardeazabal[95] introduced the Synthetic Control Method (SCM) approach to comparative case studies, which was further developed by Diamond & Hainmueller.[96] The approach constructs a so-called synthetic unit, which is a weighted unit of potential control units, to approximate the most relevant characteristics of the treated unit in the pre-treatment period. In the period after the treatment, one can estimate the counterfactual scenario of the treated unit by looking at the trend of the synthetic control unit. The GSC method used here relaxes the often-violated assumption of parallel trends and unifies older SCM with linear fixed-effects models.[97] It imputes counterfactuals for each treated unit using control group information based on a linear interactive fixed effects model that incorporates unit-specific intercepts interacted with time-varying coefficients. It has been argued that this method has several advantages: First, it allows the treatment to be correlated with the unobserved unit and time heterogeneities under more reasonable assumptions. Second, it generalises the SCM to the case of multiple treated units and variable treatment periods and improves efficiency and interpretability. Third, with a built-in cross-validation procedure, it avoids specification (p-hacking) searches and thus is easy to implement.

The synthetic model matches both pre-treatment covariates and outcomes between a treated unit and a set of control units, and uses pre-treatment periods as criteria for suitable matches (relaxing the parallel trend assumption). It provides exact weights for the control units (after implantation), thus making the comparison between the treated and synthetic control units transparent. The GSC method used here first estimates an interactive fixed effects (IFE) model using only the control group data, obtaining a fixed number of latent factors. It then estimates factor loadings for each treated unit by linearly projecting pre-treatment treated outcomes onto space spanned by these factors. Finally, it imputes treated counterfactuals based on the estimated factors and factor loadings.[98] The GSC results are explored graphically using R (package gsynth).

A. Independent variables

Bradford & Chilton, Competition Law Index (CLI) is the most extensive, elaborated, and accurate dataset of competition laws to date, including almost all countries in the world (123 out of 126) that enacted competition laws by 2010. The CLI measures the stringency of competition regulation around the world for over a century—from 1889 to 2010. Besides a dummy variable of the enactment of the laws, the CLI quantifies the essential elements of the authority granted to regulate competition and the substance of competition laws that are in force in each jurisdiction in each year since the country introduced its first competition law. They aggregated the elements into an overall index that can is used to measure the scope of competition regulation (the net regulation or risk associated with it).[99] We use Bradford and Chilton's textual laws analysis,[100] which examines the extent to which various national laws replicate the language used in the EU and USA competition laws using human coding. If there is similar language in the laws of two jurisdictions, the later adopter may have borrowed from the earlier adopter. The evidence that borrowing occurred is more reliable when the writing is identical, and even more robust when there are typographical errors.[101] Using a similarity to language and similarity of scope (using the CLI index) has suggested similar results.[102] Based on these methods, Bradford & Chilton, find that the EU model has a growing influence around the world, while the USA

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[93] Given the absence of a valid external instrument, we implement the System GMM to try to account for an element of 'persistence' in inequality data. The System GMM estimator fits linear dynamic panel-data models where the unobserved panel-level effects are correlated with the lags of the dependent variable. Maurice JG Bun & Frank Windmeijer, *The weak instrument problem of the system GMM estimator in dynamic panel data models*, 13 ECONOM. J. 95–126 (2010).

[94] Giving that our DID models already include lag of the dependent variable, we prefer to rely on the GSC in the main text, as the long T structure of the data raised concerns regarding the proliferation of the instruments. David Roodman, *A Note on the Theme of Too Many Instruments*, 71 OXF. BULL. ECON. STAT. 135–158 (2009).

[95] Alberto Abadie & Javier Gardeazabal, *The economic costs of conflict: A case study of the Basque Country*, 93 AM. ECON. REV. 113–132 (2003).

[96] Alberto Abadie, Alexis Diamond & Jens Hainmueller, *Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program*, 105 J. AM. STAT. ASSOC. 493–505 (2010).

[97] Yiqing Xu, *Generalized synthetic control method: Causal inference with interactive fixed effects models*, 25 POLIT. ANAL. 57–76 (2017).

[98] For more on the assumptions and development of the method, see the developer's original paper, ibid.

[99] Bradford & Chilton, 2018: 402.

[100] http://comparativecompetitionlaw.org/

[101] e.g. Jack L. Walker, *The diffusion of innovations among the American states*, 63 AM. POLIT. SCI. REV. 880–899 (1969).

[102] Bradford et al., 2019.

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model seems to diminish.[103] In figure 10, we plotted the treatment status (similarity to the USA after 1972) of the OECD countries in our sample.

Figure 10: Similarity to the USA model, 'treated' countries
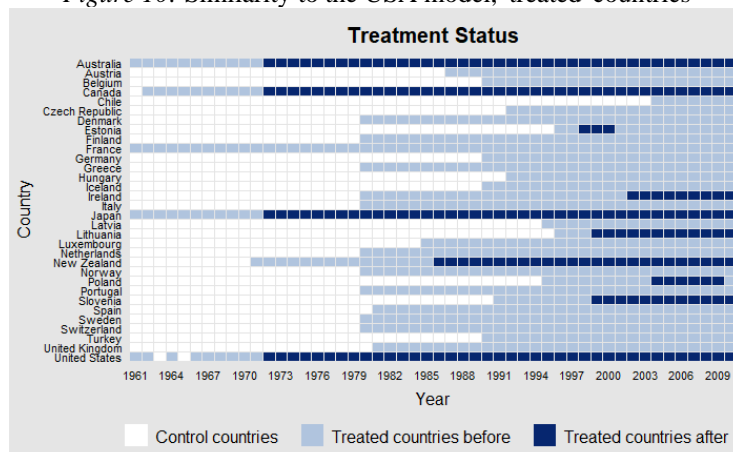
The USA, Australia, Canada, and Japan are all treated (similar to the USA) but non-shifters (from the start). Therefore their treatment effect starts in 1972. While Estonia, Ireland, Lithuania, New Zealand Poland, and Slovenia all shifted closer to the USA model (Poland and Estonia also shifted away), after 1972. As explained, these countries included textual similarity to the USA in one of the main areas of regulation (cartel, merger, or dominance). Still, not all of them have close ties to the USA model. Ireland is a good example, an EU country, with an institutional structure that shows similarity to the USA. The Irish Authority does not have the power to impose fines because, under the Irish Constitution of 1937, only courts may impose fines as the power to do so is classified as a judicial function.[104] Enforcement is, therefore, unlike most EU countries, primarily undertaken by the courts in cases instituted by the authority (in civil and minor criminal matters) or the Director of Public Prosecutions (DPP) in more serious criminal matters. The criminalisation of some antitrust acts is also similar to the US, making the public enforcement priority cartel centric.[105]

Lastly, the standard for merger control is similar to the USA and the United Kingdom - Substantial Lessening of Competition (the "SLC" test) in contrast to the EU standard of Significant Impediment to Effective Competition (the SIEC test). Again, we proxy similarity to the USA model using textual analysis.[106] Using this type of automatic data analysis eliminates the concerns relating to qualitative doctrinal research methods of objectivity of the 'similarity' criterion and is also beneficial for endogeneity issues. However, it is at risk of putting too much focus on little textual choices of the local legislature. We believe that adding a qualitative analysis help minimise errors, still enjoying the main benefits of the approach. A similar qualitative analysis of the New Zealand competition regime did not find any reason to reject the USA similarity criterion.[107] To make the assumption of similarity more reliable, we used a placebo test (checking if our definition of treatment is statistically different than a placebo similarity effect) and several sensitivity tests in the appendix section.

Our estimations method here is based on the notion that most countries decide to 'copy' one of the primary two laws that are available, and from there, develop their own unique set of competition laws slowly. However, a few countries shift, moving closer to one of the models. We use both the similarity to study the possible effect of the choice of model. To what extend text similarity can predict the macroeconomic effects? For our purpose, it is essential to emphasise that the binary indicator of similarity to USA antitrust is not exclusive. Some jurisdictions that have copied parts of the USA model copied other parts of the law from the EU. A country could be found positive for both the USA and EU, in such a case.

Our estimations equations include a set of controls represented by the vector $X'_{i,t}$ includes time-varying covariates following similar studies:[108]

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[103] Bradford et al. 2020.

[104] D DANIEL SOKOL, DANIEL A CRANE & ARIEL EZRACHI, GLOBAL ANTITRUST COMPLIANCE HANDBOOK (2014).

[105] The Irish law (relevant until 2014) was understood by The Irish Supreme Court: '[the] entire aim and object of competition law is consumer welfare. Competitive markets must serve the consumer. That is their sole purpose. Competition law, as is often said, is about protecting competition, not competitors, even if it is competitors who most frequently invoke it. Its guiding principle is that open and fair competition between producers of goods and services will favour the most efficient producers, who will thereby be encouraged to satisfy consumer demand for better quality products, wider choice, and lower prices. Their reward is a greater market share. Production of better and newer products may necessitate expensive market research, involving a degree of economic resources and market power'. *Competition Authority v. O'Regan* [2007] 4 IR 737, para. 106. The similarity to the *Pueblo Bowl-O-Mat, Inc.* USA Supreme Court ruling, mentioned above, is apparent.

[106] Bradford et. al., 2019.

[107] The New Zealand Commerce Commission is a combined regulatory and quasi-judicial authority which operates independent of any Government direction. It adjudicates on clearances and authorizations for mergers and acquisitions and authorizations for restrictive trade practices, however the Commission does not have the power to make enforcement orders (administrative sanctions). Public enforcement priority is cartel enforcement with very few dominance cases brought by the country's commission. Aspects of unique substantial law discussed above, such predatory pricing doctrine, was found to closely resemble the US. IN general the New Zealand law closely follows the Australian Law, which is as expected US orientated.

[108] For example, See Jesper Roine, Jonas Vlachos & Daniel Waldenström, *The long-run determinants of inequality: What can we learn from top income data?*, 93 J. PUBLIC ECON. 974–988 (2009). Erik Bengtsson & Daniel Waldenström, *Capital shares and income inequality: Evidence from the long run*, 78 J. ECON. HIST. 712–743 (2018).

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- Trade (separately export and import as % of GDP)[109]
- Gross Capital Formation (% of GDP, as a proxy for investments)[110]
- GDP per Capita or GDP per Capita Growth (% of GDP)[111]
- Inflation[112]
- Total government spending (% GDP)[113]
- Unemployment[114]
- Life expectancy[115]

Lastly, for our placebo test, we use the Legal Origin data from the Journal of Legal Analysis, which published Klerman et al. (2011). We use the "LO" variable, which is Kerman et al. (2011) 's coding of legal origins, and the "CO" variable, which is their coding of colonial power.[116]

B. Dependent variables

The dependent variables are the Gini index taken from The Standardized World Income Inequality Database (SWIID).[117] The gross Gini (gini_mkt), the net Gini (gini_disp) index and the EHII index (Estimated Household Income Inequality), respectively taken from the SWIID (Standardized World Income Inequality Database)[118] and the UTIP-UNIDO (University of Texas Inequality Project – United Nations Industrial Development Organization). While the Gini indices span the period between 1960 and 2019, the EHII covers a slightly shorter period, between 1963 and 2015. We use both Gini indicators as another control for taxation differences between countries and across time, as the Gini disposable income represents income distribution taking into account redistribution policies (public transfers). The indicators range between 0 (perfect equality in income distribution) to 1 (perfect inequality).

Income shares accumulated by the top one percentile are taken from the World Inequality Lab. The World Inequality Data (WID) is based on the Alvarado and Piketty project and includes more researchers from around the globe, many mentioned in this paper. The WID combines different data sources: national accounts, survey data, fiscal data, and wealth rankings in one of the larger inequality research projects in the world.[119] Full variable list for the OECD descriptive statistics are available in Table A1 in the appendix, here we provide a summary statistics of the main variables:

Table 2. Summary statistics[120]

Variable Name	Source	Obs	Mean	Std.Dev.	Min	Max
gini_disp	SWIID	5248	0.383	0.086	0.175	0.665
gini_mkt	SWIID	5248	0.455	0.063	0.217	0.705
ehii	UTIP-UNIDO	4559	42.509	7.358	20.578	62.85
gdp_pc	WDI	5105	14014.08	17476.87	285.586	140635.9
gdp_pcg	WDI	3,024	2.156	5.914	-64.992	53.974
gov_exp	WDI	7471	16.028	7.912	0	147.733
life_exp	WDI	10708	63.879	11.416	18.907	85.417
inv	WDI	7475	23.331	8.655	0.293	95.32
inflat	WDI	7550	18.67948	152.9491	-60.4964	7481.66

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[109] Max Roser & Jesus Crespo Cuaresma, *Why is Income Inequality Increasing in the Developed World?*, 62 Rev. Income Wealth 1–27 (2016). Following the Stolper–Samuelson theorem, the authors suggest that separating the import and export, could improve proxies for trade globalization effects. See NE.EXP.GNFS.ZS, NE.IMP.GNFS for definition.

[110] See definition here NE.GDI.TOTL.ZS.

[111] See definition here NY.GDP.PCAP.KD.ZG

[112] See definition here FP.CPI.TOTL.ZG

[113] On the significant of the proxy for the progressives of the country see Joseph Zeira & Michele Battisti, Inequality and Public Policy 7-8 (2018). See definition here NE.CON.GOVT.ZS. In the USA time-series we also use the Tax Revenue (% of GDP) See definition here GC.TAX.TOTL.GD.ZS.

[114] Van Arnum and Naples, 2013.

[115] Note that we use of life expectancy as a proxy for the level of health care, and an alternative for using a proxy for the education level. We acknowledge that education would have been a better proxy for human capital and that it plays a crucial role in shaping inequality (Mark Huggett, Gustavo Ventura & Amir Yaron, *Sources of Lifetime Inequality*, 101 AM. ECON. REV. 2923–2954 (2011)). However, the limited amount of data and the presence of several missing values would have dropped considerably our samples on which to perform the analysis. For the USA, for example, there only nine observation in the world bank dataset for School enrolment 1960-2010. See SP.DYN.LE00.IN for definitions. Therefore, we opted for the life expectancy proxy, which is highly correlated to the education measure (rho=0.85) and which has the advantage to cover nearly the whole sample in our analysis.

[116] The data is available at: https://academic.oup.com/jla/article/3/2/379/899816#supplementary-data. The zip file includes "Klerman_etal_LO_v_CO.dta."

[117] https://fsolt.org/swiid/

[118] The source of the Gini indices, the SWIID dataset, "represents a particular choice in the balance between comparability and coverage: it maximizes comparability for the broadest available set of country-year observations" (Solt, 2009).

[119] https://wid.world/data/

[120] The *inflation* proxy presents high values in absolute terms with respect to the min and max. We decided to report them in the table because they are not the result of a measurement error. Indeed, the maximum value of the inflation refers to the hyperinflation experienced by Peru in early 1990s and the minimum value describes the deflation which took place in Angola around 2010. However, in the econometric analysis, since we take the logarithmic transformation, negative values (that account for roughly 3% of the total sample) are automatically dropped out of the sample and the few outliers present in the sample are rescaled. The minimum value of 0 of the *gov_exp* refers to Mali, over the period 1980-1984 (low level of public expenditure are mainly found in low developed countries, for which controls are also missing especially at the beginning of the time sample).

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		unemployment	WDI	5080	7.798	6.083	0.091	37.976

unemployment	WDI	5080	7.798	6.083	0.091	37.976
imp_gdp	WDI	7974	41.249	26.444	0.016	236.391
exp_gdp	WDI	7974	35.271	26.442	0.005	228.994

VI. RESULTS

A. DID estimations

Table 3 present the results for the panel data, using similarity to the USA Sherman Act, with the two Gini indicators based on three specifications – fixed effects, geographical time trends, and autocorrelation of the dependent variable. Table 4 does the same for the top income shares data.

      The similarity to the antitrust law is positive in all of the models and significant in the majority, suggesting that competition laws which resemble the USA in text, are linked to a higher the level of economic inequality. Notice that the control variables are mostly stable for the same dependent variable, with the expected sign. However, the significance levels for the Gini measures and the top income shares change between tables 3 and 4, with respect to the similarity factor and controls. For example, the gov_exp becomes insignificant for the income top shares, while the life expectancy acts the other way around. The Gini models have a higher number of observations, but they could be misleading, due to the structure of the Gini index.[121] The income share, on the other hand, provides a clearer view on the distribution of gains in the society; however, they are more persistent (as can be seen in the correlation of the lag variables).

Table 3. Gini, similarity to the US antitrust

	(1)	(2)	(3)	(4)	(5)	(6)
	log_gini_mkt	log_gini_mkt	log_gini_mkt	log_gini_disp	log_gini_disp	log_gini_disp
resemb_us	0.022***	0.014*	0.013	0.011	0.001	0.000
	(0.005)	(0.008)	(0.008)	(0.016)	(0.020)	(0.021)
log_lifeexp	-0.295	-0.422	-0.441	-0.758	-1.009*	-1.018*
	(0.348)	(0.407)	(0.406)	(0.452)	(0.505)	(0.517)
log_gdp_pc	0.010	0.008	0.008	0.004	0.010	0.013
	(0.034)	(0.037)	(0.037)	(0.048)	(0.050)	(0.050)
log_exp	-0.018	0.012	0.016	-0.087	-0.064	-0.060
	(0.039)	(0.035)	(0.036)	(0.054)	(0.054)	(0.055)
log_imp	0.054	0.022	0.020	0.095*	0.071	0.068
	(0.047)	(0.047)	(0.047)	(0.052)	(0.049)	(0.049)
log_unempl	0.019	0.026*	0.027*	0.031*	0.045**	0.046**
	(0.012)	(0.014)	(0.014)	(0.018)	(0.019)	(0.019)
log_inflat	0.003	0.001	0.001	0.002	0.001	0.000
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
log_inv	-0.017	0.012	0.014	-0.028	0.022	0.027
	(0.033)	(0.036)	(0.035)	(0.044)	(0.045)	(0.044)
log_gov_exp	-0.075**	-0.068**	-0.076**	-0.204***	-0.195**	-0.201**
	(0.035)	(0.032)	(0.034)	(0.074)	(0.075)	(0.077)
D.log_gini_mkt			0.337			
			(0.224)			
D.log_gini_disp						0.258
						(0.206)
_cons	0.483	0.929	1.019	2.636	3.453	3.446
	(1.526)	(1.856)	(1.851)	(2.195)	(2.506)	(2.560)
Obs.	677	677	676	677	677	676
R-squared	0.929	0.941	0.941	0.980	0.983	0.983
Country Year FE	YES	YES	YES	YES	YES	YES
Geographical Region Time Trend	NO	YES	YES	NO	YES	YES

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

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[121] Thomas Piketty & Arthur Goldhammer, Capital in the twenty-first century (2014): 266-269.

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Table 4. Top Income Share, similarity to the US antitrust

	(1) log_top1	(2) log_top1	(3) log_top1	(4) log_top10	(5) log_top10	(6) log_top10
resemb_us	0.084**	0.082*	0.096**	0.032*	0.033	0.042**
	(0.037)	(0.041)	(0.044)	(0.019)	(0.019)	(0.020)
log_lifeexp	-5.001**	-4.820**	-5.251**	-2.456**	-2.395**	-2.660***
	(1.965)	(2.169)	(2.231)	(0.923)	(0.993)	(0.948)
log_gdp_pc	0.024	0.098	0.127	0.091	0.102	0.114
	(0.132)	(0.162)	(0.156)	(0.067)	(0.074)	(0.070)
log_exp	0.134	0.174	0.175	0.056	0.074	0.073
	(0.169)	(0.209)	(0.175)	(0.073)	(0.079)	(0.077)
log_imp	0.036	0.018	-0.039	0.061	0.052	0.028
	(0.191)	(0.229)	(0.207)	(0.095)	(0.101)	(0.101)
log_unempl	-0.011	-0.004	0.007	0.015	0.014	0.019
	(0.040)	(0.043)	(0.047)	(0.016)	(0.017)	(0.018)
log_inflat	0.002	0.002	-0.002	-0.010*	-0.010*	-0.011**
	(0.012)	(0.013)	(0.012)	(0.005)	(0.005)	(0.005)
log_inv	0.104	0.111	0.133	0.018	0.023	0.028
	(0.135)	(0.140)	(0.171)	(0.059)	(0.062)	(0.072)
log_gov_exp	-0.240	-0.166	-0.230	-0.034	-0.024	-0.045
	(0.164)	(0.185)	(0.194)	(0.071)	(0.081)	(0.090)
D.log_top1			0.428***			
			(0.071)			
D.log_top10						0.447***
						(0.059)
_cons	18.594**	16.868*	18.687*	8.154**	7.735*	8.855**
	(8.192)	(9.261)	(9.942)	(3.986)	(4.376)	(4.281)
Obs.	595	595	589	582	582	575
R-squared	0.926	0.930	0.939	0.955	0.956	0.961
Country Year FE	YES	YES	YES	YES	YES	YES
Geographical Region Time Trend	NO	YES	YES	NO	YES	YES

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

The Gini results seem more sensitive, when the Gini net (after public transfers) is never significant, suggesting that heterogeneity in taxation within the OECD group still affects our estimations. The gov_exp again is negative and significant for the Gini models, and unemployment is positive, on the other hand. In the log-log models, the coefficient presents elasticity. For example, a 1% increase in government consumption is associated with -7.6% (=100*0.076) in the gini_mkt. For the binary treatment effect, the shift to a closer USA competition law model is associated with a 4.2% (=100*0.042) increase in the top10 income share – supporting the notion that a USA model is more inclined to inequality. Again, we do not see this result as a causal link, but a correlation that requires further investigation. The main problem with this estimation is that our counterfactual element is weak as we do not control for all omitted variables. The similarity to the USA model comes with many other uncontrol similarities. Of course, as explained, fixed effects for year and country help with limiting these concerns alongside the geographical time trends as before. In the appendix (Table A9), we also include the econometric workhorse system-GMM model, although, again, giving long time-period (and the number of instruments) it is not necessarily ideal. We also re-run the same DID model using only a small number of countries which use Section 2 of the Sherman Act text (monopolisation). Both of these robustness checks points towards the same conclusion: the coefficient is positive for all models and highly significant for the Gini disposable income in the GMM, and positive and highly significant for almost all of the models in the DID - Section 2 similarity.

B. GSC estimations

All DID model relies on the parallel trend assumption so the GSC should have an important contribution. We, therefore, use the GSC for the four countries in the shifters' group, with the 'always treated' group after 1972 (figure 10). When the number of treated units is small (N<40), a parametric bootstrap procedure is preferred. We also included the cross-validation procedure and EM algorithm that takes advantage of the treatment group information in the pre-treatment period,[122] with an interactive fixed effects model (using gsynth function in R) as suggested in the developers' specification. First, we use this specification without any controls to prevent any effect of multicollinearity. The results are positive and significant, with an estimated effect of 0.13 (***p-value~0).

Next, we included four controls only (as the algorithm does not support missing values), to maximise the number of observations, using log-log transformation and the lag of the dependent variable (top10) for consistency

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[122] Laurent Gobillon & Thierry Magnac, *Regional policy evaluation: Interactive fixed effects and synthetic controls*, 98 REV. ECON. STAT. 535–551 (2016).

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with the DID models: government expenditure, GDP per capita growth (percentage), inflation, and Life expectancy. With this specification, we report the top10 income share graphically only, as the dependent variables. The top1 income share results are similar and consistent (see Table 5). The model includes 8 'treated' countries (Estonia and Lithuania are out because of too few pre-treatment periods): Australia, Canada, Ireland, Japan, Poland, Slovenia, New Zealand and the USA. The blue line (figure 11) represents the Y (logarithm of the top 10% income share) zero counterfactual. As can be seen, the GSC estimates an increase in income share as a long-term effect of the antitrust model. As can be seen in both the average treatment effects (ATT) and the Ireland case, the treatment coefficient is positive, reflecting a positive correlation between the USA model similarity criterion and an increase in income inequality.

Figure 11: 10% income share similarity to the USA model, EM algorithm, OECD
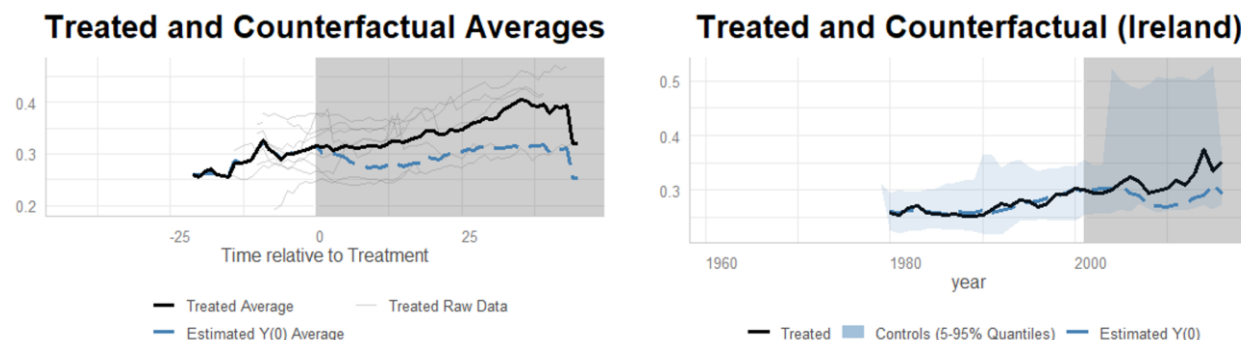

This effect is evident in the first 20 years after the shift, which is in agreement with our finding in the USA DID model. The ATT 0.0455 (SE 0.002, P-value<0.01***) which is higher than the 0.042* found in the autocorrelation model (Table 4 column 6). Figure 12 presents the long-term estimated effects of similarity to the USA antitrust.

Figure 12: 10% income share similarity to the USA model, EM algorithm, OECD
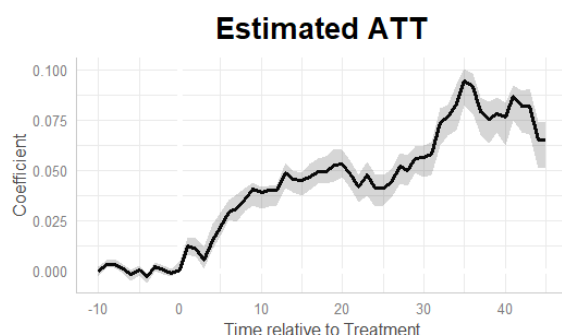
The appendix includes the list (Table A5) of countries used in the Model. In contrast to the SCM, the GSC method can use a negative weight for some countries. While the synthetic control method involves estimating weights for each control unit, the goal of GSC is to estimate factors using information from control units (so it doesn't directly involve weights estimation). In figure 13, the latent factors and factor loading for the model are presented. The factors loading is the core of the GSC algorithm, used to create the counterfactual trend of the treated countries. Figure 13 presents the estimated latent factors and factor loadings produced by the GSC.

*Figure 13*: 10% Income Share, similarity to the USA, EM algorithm, OECD
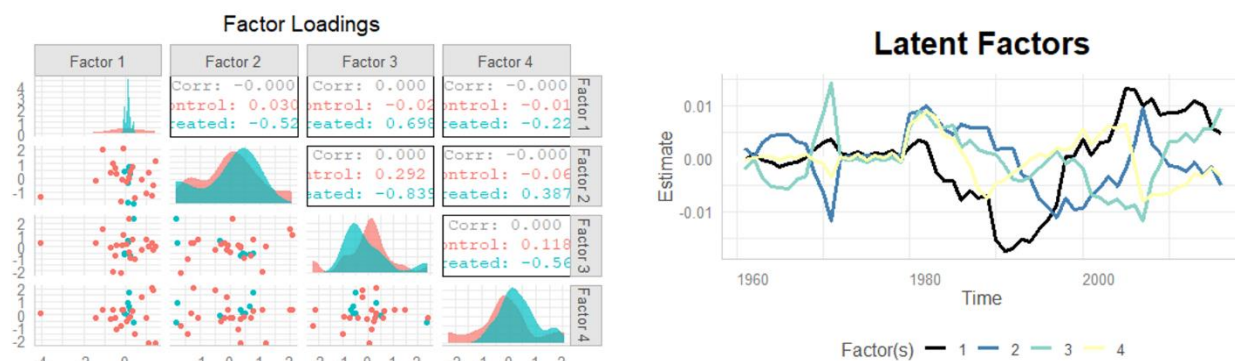
In the right panel, the x-axis is the year, and the y-axis is the magnitude of factors. The left panel shows the estimated factors loadings for the treated unit (turquoise) and controls (red) units, with x- and y -axes indicating the magnitude of the loadings for the first and second factors, respectively. The caveat is that estimated factors may not be directly interpretable because they are, at best, linear transformations of the actual factors. These factors could relate to

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business cycles or other omitted variables. We used another specification of Matrix Completion Methods (MC model) to test the robustness of our results.[123] This specification is not dependent on the latent factor analysis but uses a different regularisation scheme and takes advantage of the treatment group information in the pre-treatment period as well (non-parametric). The results remain similar where treated countries, such as Ireland and New Zealand in figure 14 exhibit an increase in income inequality after the change. While in the first case (Ireland, figure 11), the change is stable, the New Zealand case seems less convincing.

Figure 14: Treatment effects USA model, MC model, OECD
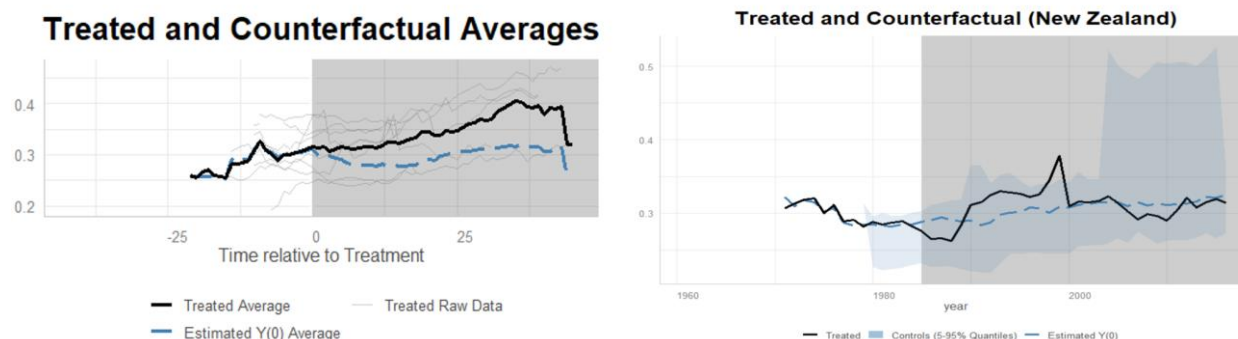
The effects are ATT is similar (0.045, S.E. 0.017) but is only statistically significant at a level of 0.1 (P-value = 0.0619*). Table 5 summaries all GSC results.

Table 5. Treatment Effect on the Treated, GSC models

	Model	Controls	Dependent Variable	ATT	S.E	CI.lower	CI.upper	P-value
1	EM – similarity	NO	top10	0.04611	0.00273	0.03951	0.05	~0***
2	EM – similarity	YES	top10	0.04551	0.00201	0.0405	0.04845	~0***
3	MC – similarity	YES	top10	0.04533	0.01708	-0.00103	0.06445	0.061*
4	EM – similarity	NO	top1	0.01536	0.00158	0.01292	0.01897	~0***
5	EM – similarity	YES	top1	0.01558	0.00093	0.01496	0.01862	~0***
6	MC – similarity	YES	top1	0.01685	0.00679	-0.00384	0.02457	0.094*

In the appendix (Figure A3, and Table A6), you can find placebo testing for the similarity to the USA proxy. The idea behind placebo testing is similar to the classic experiment terminology: a similar treatment, which is unrelated to our hypothesis, shows no correlation to economic inequality. We used the Legal Origin literature[124] to create placebo treatment for the legal origin of 'Common' law countries and British colonial power. Both groups include a similar sample from the OECD textual resemblance to the USA. We considered all countries in the two groups as treated after 1972. We use the same GSC specification EM-algorithm and find no effect (P-value>0.1). In the supplementary file, the reader can find full replication data and code, including additional models of the GSC using the Gini net (Gini disposable income). The results are consistent, but we do not discuss them due to the paper's scope limitation. Yet, the interpretations of these results should be approached cautiously. The number of treated (shifters) countries in the OECD dataset is small (8 in most models). Despite the synthetic control technique, the shifters present a very narrow picture. The advantage of using similarity to the USA model is that the textual similarity is closer to an exogenous variable than other law measures, such as scope or number of antimonopoly cases. It provides for an exciting path for further inquiry and echoes the results of previous work.[125]

VII. DISCUSSION AND CONCLUSIONS

This paper provides a first rigorous attempt to look at the link between competition laws and economic inequality from an empirical point of view. First, we reviewed the theoretical framework that links competition laws, competition and economic inequality. Two driving forces tie competition to inequality: price effects of monopoly power in essential product markets and monopsony effects in labour markets. While the legal debate often assumes that the law is influencing macroeconomic outcomes, we conceptualised the association between antitrust law, as a key example, and economic inequality in the USA. We then showed that the USA Antitrust story is descriptively associated with the economic inequality trends of the 70s-90s decades. Second, to bypass the limitations of cross-country comparisons using leximetric legal indexes, we used similarity to the model of law. The model of law choice is an empirical alternative that incorporates appetite for enforcement and ideological differences between competition law

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[123] Susan Athey et al., *Matrix Completion Methods for Causal Panel Data Models*, ARXIV171010251 ECON MATH STAT (2018), http://arxiv.org/abs/1710.10251 (last visited Mar 7, 2020).

[124] Daniel M. Klerman et al., *Legal origin or colonial history?*, 3 J. LEG. ANAL. 379–409 (2011). We acquired the data from Journal of Legal Analysis, which published Klerman et al. (2011). The data is available at: https://academic.oup.com/jla/article/3/2/379/899816#supplementary-data. The zip file includes "Klerman_etal_LO_v_CO.dta." We use the "LO" variable, which is Klerman et al. (2011)'s own coding of legal origins, and the "CO" variable, which is their own coding of colonial power.

[125] GUTIERREZ AND PHILIPPON, 2018.

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regulations. Furthermore, the model of law hypothesis reflects key differences in antitrust enforcement efforts such as the balance between cartel and monopolisation, and private vs public enforcement efforts. Overall it relates to the question: on what side of the 'error' regulators prefer to fall? We tested the hypothesis that the 'model of law', specifically the USA model, could be linked to trends of economic inequality. The main finding from the analysis is that the correlation between the USA model of law and economic inequality is robust to several econometric methods and sensitivity tests. Countries that are similar to the USA, in terms of competition law text, are more likely to exhibit high inequality trends. Two main points come up for our findings:

(1) Among the different aspects of the competition law model, the weakness of dominance provisions and the absence of enforcement efforts in this area seem a defining aspect of the USA model.

(2) The USA antitrust model is unique in its institutional framework. However, regulation choices which are essential parts of the antitrust model might be associated with less competition and higher inequality.

The application of our findings could be crucial to competition policy in the future. We expect a high level of heterogeneity between countries' economic inequality causes, although the phenomenon seems to be relevant to most if not all developed countries.[126] If the claim that market power is on the rise globally proves to be robust,[127] competition laws likely played a passive part (ineffectiveness) in these two common trends, i.e. inequality and the level of competition. Enforcers allowed for concentration to rise but with little or no significance to cross-country differences between competition law enforcement models. In this case, competition laws should be revamped entirely.

If market power is not a clear global trend,[128] related mostly to some developed economies, concentration levels can be primarily explained by innovation and efficiencies (the superstar firms). In this case, competition laws need to adapt quickly to economic insights. The economy has changed dramatically since the 1970s and law's stagnation is apparent, especially by the USA antitrust. It is essential to recognise that this stagnation is a policy choice, as well. Reform should focus on reinforcing intensified competition 'for the market' with precise merger regulation and dominance control, or else market power can soon be globally on the rise.[129] Our findings, relate more to the second narrative, suggesting that competition law enforcement becomes part of the problem when it does not send a strong signal to counter-affect the rise of big-data and other superstar firms. Researchers should further focus on antimonopoly norm to understand the links between competition law enforcement and macroeconomic results.

This paper sheds light on the mechanisms infused in the model of law choice and their possible macroeconomic results. It is the first step in understanding the link between competition laws and economic inequality. Further empirical and theoretical studies are explicitly required on the effects of abuse of dominance and monopolisation regulation. It seems that the gap in research is also part of the stagnation of antitrust and competition laws which have yet to adapt to the new macroeconomic reality.

VIII. APPENDIX

Table A1. Descriptive Statistics, OECD Database

Description of the variable	Variable	Stats / Values	Graph	Missing
Government expenditure (as %GDP)	GOV_EXP [numeric]	Mean (sd) : 17.9 (4.9) min < med < max: 5.6 < 18.3 < 42.2 IQR (CV) : 6.1 (0.3)		472 (21.26%)
Merchandise Trade %GDP	Trade [numeric]	Mean (sd) : 52.4 (32.3) min < med < max: 5.6 < 45.5 < 182.1 IQR (CV) : 29.3 (0.6)		393 (17.7%)
Life expectancy (years)	Life_EXP [numeric]	Mean (sd) : 74.1 (5.4) min < med < max: 45.4 < 74.4 < 84.2 IQR (CV) : 7.1 (0.1)		41 (1.85%)
Gross capital formation	GC_F [numeric]	Mean (sd) : 24.2 (5) min < med < max: 8.6 < 23.6 < 48.3 IQR (CV) : 5.8 (0.2)		482 (21.71%)
GDP per capita annual growth	GDP_PCG [numeric]	Mean (sd) : 2.6 (3.2) min < med < max: -14.3 < 2.4 < 24 IQR (CV) : 3.3 (1.3)		369 (16.62%)
inflation (consumer price)	inflation [numeric]	Mean (sd) : 11.7 (52.9) min < med < max: -4.5 < 3.6 < 1281.4 IQR (CV) : 6.3 (4.5)		226 (10.18%)
Total unemplyment labour	unemploy [numeric]	Mean (sd) : 7.9 (4.2) min < med < max: 1.1 < 7 < 27.5 IQR (CV) : 5.1 (0.5)		1147 (51.67%)
Export as %GDP	Exp_gdp [numeric]	Mean (sd) : 36.3 (26.1) min < med < max: 2.1 < 29.5 < 221.2 IQR (CV) : 24.6 (0.7)		482 (21.71%)
Import as %GDP	Imp_gdp [numeric]	Mean (sd) : 35.8 (22.3) min < med < max: 3.7 < 30.5 < 187.2 IQR (CV) : 22.1 (0.6)		482 (21.71%)
Membership in the eu	eu [integer]	Min : 0 Mean : 0.6 Max : 1		0 (0%)

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[126] Nolan et al., 2018.

[127] Federico J. Diez, Jiayue Fan & Carolina Villegas-Sánchez, *Global Declining Competition*.

[128] GERMÁN GUTIÉRREZ & THOMAS PHILIPPON, *How EU markets became more competitive than US markets: A study of institutional drift* (2018); In a second paper two of the authors clam that the USA markets have moved from 'good' to bad 'concentration', See MATIAS COVARRUBIAS, GERMÁN GUTIÉRREZ & THOMAS PHILIPPON, *From Good to Bad Concentration? US Industries over the past 30 years* (2019).

[129] Carl Shapiro, *Antitrust in a Time of Populism*, 61 INT. J. IND. ORGAN. 714–748 (2018).

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Description of the variable	Variable	Stats / Values	Graph	Missing
Estimated Household Income inequality index	ehii [numeric]	Mean (sd) : 40.3 (7.8) min < med < max: 20.6 < 41.2 < 56.6 IQR (CV) : 12 (0.2)		1262 (56.85%)
Net Gini index	gini_disp [numeric]	Mean (sd) : 0.3 (0.1) min < med < max: 0.2 < 0.3 < 0.5 IQR (CV) : 0.1 (0.2)		649 (29.23%)
Gross Gini index	gini_mkt [numeric]	Mean (sd) : 0.5 (0) min < med < max: 0.3 < 0.5 < 0.5 IQR (CV) : 0.1 (0.1)		649 (29.23%)
World Bank geographical regions	Region [factor]	1. East Asia & Pacific 2. Europe & Central Asia 3. Latin America & Caribbean 4. Middle East & North Afric 5. North America 6. South Asia 7. Sub-Saharan Africa		0 (0%)
World Bank income group	incomegroup [factor]	1. High income 2. Low income 3. Lower middle income 4. Upper middle income		0 (0%)
Competition law in the country active	competition_law_in_place [integer]	Min : 0 Mean : 0.9 Max : 1		552 (24.86%)
Competition CLI index	cli_overall_norm [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.5 < 1 IQR (CV) : 0.5 (0.6)		552 (24.86%)
Competition CLI abuse of dominance score	cli_dominance_norm [numeric]	Mean (sd) : 0.5 (0.3) min < med < max: 0 < 0.6 < 1 IQR (CV) : 0.8 (0.7)		552 (24.86%)
The law of the country uses similar language as the EU competition law	resemb_eu [integer]	Min : 0 Mean : 0.4 Max : 1		552 (24.86%)
The law of the country uses similar language as the USA antitrust laws	resemb_us [integer]	Min : 0 Mean : 0.2 Max : 1		552 (24.86%)
Top1% income share	top1 [numeric]	Mean (sd) : 0.1 (0) min < med < max: 0.1 < 0.1 < 0.2 IQR (CV) : 0.1 (0.2)		1641 (73.92%)
Top10% income share	top10 [numeric]	Mean (sd) : 0.4 (0) min < med < max: 0.3 < 0.4 < 0.5 IQR (CV) : 0.1 (0.1)		1595 (71.85%)
Tax revenue as %GDP	Taxrev [numeric]	Mean (sd) : 34.2 (7.3) min < med < max: 15.8 < 34.2 < 49.5 IQR (CV) : 12.2 (0.2)		1574 (70.9%)
Tax on income, profits and capital gains out of total revenue	TaxICP [numeric]	Mean (sd) : 13.9 (5) min < med < max: 3.3 < 13.1 < 30.4 IQR (CV) : 5.2 (0.4)		1574 (70.9%)
Taxes on international trade	TaxIndICP [numeric]	Mean (sd) : 10.9 (4.7) min < med < max: 1.9 < 10.1 < 25.8 IQR (CV) : 4.7 (0.4)		1574 (70.9%)
Gross domestic spending on R&D	TPC_GDP [numeric]	Mean (sd) : 1.7 (0.9) min < med < max: 0.1 < 1.6 < 4.9 IQR (CV) : 1.3 (0.6) 1070 distinct values		1150 (51.8%)
Aggregated markups USA	markups [numeric]	Mean (sd) : 1.4 (0.1) min < med < max: 1.2 < 1.3 < 1.5 IQR (CV) : 0.1 (0.1)		9 (15%)
Foreign direct investment, net outflows (% of GDP)	fdi_out %GDP [numeric]	Mean (sd) : 1.3 (0.9) min < med < max: -0.4 < 1 < 3.6 IQR (CV) : 1.4 (0.7)		11 (18.33%)
Foreign direct investment, net inflows (% of GDP)	fdi_in %GDP [numeric]	Mean (sd) : 1.2 (0.9) min < med < max: 0.1 < 1.1 < 3.4 IQR (CV) : 1.2 (0.7)		11 (18.33%)

In the next pages, we include additional sensitivity and robustness checks to the primary analysis. As support for our hypothesis regarding the 'model of law,' we include a first-difference model for the correlation between markups (as a proxy for competition) and income share in the USA time series. This part is aimed to address the theoretical foundations of the paper supported in the literature review. It is also an effective way to control for alternative explanations to the competition~inequality link, that we are unable to in the comparative panel data due to data limitations. Our additional contribution is using the law indicators mentioned in the main text as instruments in the 2SLS model – Table A4. The correlation between economic inequality and competition, as proxied by aggregated markups, is based on the following first-difference regression model:

$$\text{top1}_t - \text{top1}_{t-1} = \Delta\text{top1} = \delta\Delta\text{ markup} + \Delta X' + v$$

The dependent variable is the share of income going to the 1% ($\text{top1}_{i,t}$) or 10% ($\text{top10}_{i,t}$) in the USA. The Δ notation refers to the difference between two values in the previous year (for example $\text{markups}_t - \text{markups}_{t-1}$). No country-fixed effects (α_i), and no year fixed-effects (β_t), which are included in the panel data equation of the main text. The reason to include FD is that the USA markups times-series shows non-stationary behaviour.[130] Auto Correlation Function (ACF) plot is a visual way to show the serial correlation in time series data. Serial correlation (also called autocorrelation) is where an error at one point in time travels to a subsequent point in time. For a stationary time series, the ACF will drop to zero relatively fast, while the ACF of non-stationary data decreases slowly. Also, for non-stationary data, the value of the first correlation is often large and positive.

Figure A1: ACF USA top 1% Income share

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[130] A stationary (time) series is one whose statistical properties such as the mean, variance and autocorrelation are all constant over time. Hence, a non-stationary series is one whose statistical properties change over time. Non-stationary behaviors can be trends, cycles, random walks, or combinations of the three.

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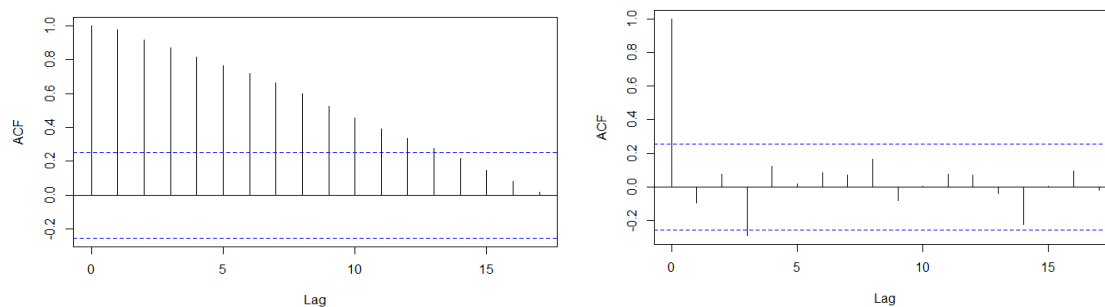
On the left, the top1 income share ACF, on the right, the first difference ACF. For the FD series, The Ljung-Box Q* statistic has a *p*-value of 0.5213 (for h=10). The KPSS Unit Root Test[131] supports the same conclusion with a test-statistic value of 1.2536. Studentized Breusch-Pagan shows no evidence for heteroskedasticity (*P*-value larger than 0.5). The vector $X'_{i,t}$ includes time-varying covariates following similar studies:[132] General government final consumption expenditure (% of GDP), several trade indicators including: Merchandise trade (% of GDP), Trade Openness, and a separate import and export indicators, Life expectancy at birth, total (years), Gross capital formation (% of GDP, as a proxy for investments), GDP per capita growth (annual %), Inflation and the percentage of workers unionised from the total workers, per year. We include the OECD Gross domestic spending on R&D, as it includes data from 1981-2018. The indicator measures the total expenditure (current and capital) on R&D carried out by all resident companies, research institutes, university and government laboratories, etc., in a country. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy. Theoretically, from these covariates, the most crucial to the analysis is the general government final consumption expenditure (gov_exp), which is considered as the most robust proxy for the level of redistribution in the country (tendency towards progressive policy), mostly via tax and transfer policies.[133] As a sensitivity test in column 10 Table A2, we replace this variable with the Tax Revenue % of GDP, mentioned above. From our perspective, this is actually, a narrower proxy than government spending, and the results do not change dramatically. Yet, the gov_exp is still limited control, as shows by Saez and Zucman.[134] Advance state-level measures for regulation were found to be associated negatively with growth and poverty, but could not be applied in contrast to the Federal antitrust regime.[135] Note that we use of life expectancy as a proxy for the level of health care, and an alternative for using a proxy for the education level, like in the main text. This choice is motivated by the minimal cover (across countries and time) of education proxies, in a way that can distort panel data estimations of large samples. For the USA, for example, there only nine observation in the world bank dataset for School enrolment 1960-2010. We added each of the control variables in a separate estimation to minimise the chance for spurious results.

Table A2. Conditional Effects on 1% Income Share, Markups-FD, USA

	Dependent variable:									
	FD top1									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FD markups	0.143** (0.053)	0.123*** (0.046)	0.135*** (0.048)	0.135*** (0.049)	0.144** (0.065)	0.132** (0.059)	0.129* (0.067)	0.162*** (0.053)	0.166*** (0.054)	0.145** (0.054)
FD inflation	0.001* (0.001)	0.001 (0.0005)	-0.001 (0.001)	-0.001 (0.001)	0.0005 (0.001)	0.002 (0.002)	0.002 (0.002)	0.001** (0.001)	0.0004 (0.001)	0.001 (0.001)
FD GOV_EXP		-0.006*** (0.002)	-0.004** (0.002)	-0.004** (0.002)	-0.005** (0.002)	-0.005* (0.003)	-0.005 (0.004)	-0.001 (0.004)	-0.001 (0.004)	
FD Taxrev										0.004** (0.001)
FD Trade			0.003*** (0.001)	0.003*** (0.001)	0.002* (0.001)	0.001 (0.001)	0.001 (0.001)			0.001 (0.001)
FD openness								-0.002 (0.002)		
FD imp_gdp									0.003 (0.002)	

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[131] Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root? *54*(1-3) *Journal of Econometrics* 159–178 (1992).

[132] Chong & Gradstein, 2007; Elias Papaioannou & Gregorios Siourounis, *Democratisation and growth*, 118 ECON. J. 1520–1551 (2008).

[133] Zeira and Battisti 2018, at 7-8.

[134] Emmanuel Saez & Gabriel Zucman, *The triumph of injustice: How the rich dodge taxes and how to make them pay* (2019).

[135] Dustin Chambers, Patrick A. McLaughlin & Laura Stanley, *Regulation and poverty: an empirical examination of the relationship between the incidence of federal regulation and the occurrence of poverty across the US states*, 180 PUBLIC CHOICE 131–144 (2019) finding a negative correlation between the a weighted state-level CFR index and poverty rates; Dustin Chambers, Courtney A. Collins & Alan Krause, *How do federal regulations affect consumer prices? An analysis of the regressive effects of regulation*, 180 PUBLIC CHOICE 57–90 (2019) offer the theoretical explanation finding a positive correlation between the sate-level CFR and prices, and that these price increases have a disproportionately negative effect on low-income households. They find that the poorest households spend larger proportions of their incomes on heavily regulated goods and services prone to sharp price increases. The increase of regulation works in the same direction as decrease in competition regulation, but both should be captured in the markups proxy.

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FD exp_gdp									0.0001 (0.002)	
FD Life_EXP				-0.0001 (0.003)	0.008 (0.006)	0.005 (0.007)	0.005 (0.007)	0.007 (0.004)	0.007 (0.004)	0.005 (0.003)
FD GDP_PCG					0.0003 (0.0004)	0.001 (0.001)	0.001 (0.001)	0.001 (0.0004)	0.0005 (0.0005)	0.001* (0.001)
FD TPC_GDP					0.007 (0.013)					
FD Labour_union % labour						-0.0003 (0.003)	-0.001 (0.004)			
FD GC_F							-0.0002 (0.002)	0.00004 (0.002)	0.0001 (0.002)	-0.0003 (0.001)
Observations	50	50	50	50	29	27	27	40	40	38
R²	0.170	0.326	0.435	0.435	0.654	0.720	0.720	0.497	0.534	0.596
Adjusted R²	0.134	0.282	0.385	0.371	0.539	0.617	0.596	0.386	0.414	0.502
Residual Std. Error	0.006 (df = 47)	0.005 (df = 46)	0.005 (df = 45)	0.005 (df = 44)	0.005 (df = 21)	0.004 (df = 19)	0.005 (df = 18)	0.005 (df = 32)	0.005 (df = 31)	0.004 (df = 30)
F Statistic	4.801** (df = 2; 47)	7.414*** (df = 3; 46)	8.657*** (df = 4; 45)	6.772*** (df = 5; 44)	5.679*** (df = 7; 21)	6.981*** (df = 7; 19)	5.792*** (df = 8; 18)	4.509*** (df = 7; 32)	4.439*** (df = 8; 31)	6.329*** (df = 7; 30)

Note: table includes robust standard errors (HC1)   *p<0.1;
**p<0.05; ***p<0.01

Table A3. Conditional Effects on 10% Income Share, Markups-FD, USA

	Dependent variable:									
	FD top10									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
FD markups	0.156*** (0.052)	0.129*** (0.043)	0.142*** (0.045)	0.140*** (0.046)	0.116** (0.056)	0.103* (0.052)	0.103 (0.064)	0.151*** (0.050)	0.156*** (0.050)	0.137*** (0.049)
FD inflation	0.001 (0.001)	0.0002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.0001 (0.001)	0.001 (0.001)	0.001 (0.002)	0.001 (0.001)	0.00001 (0.001)	0.0004 (0.001)
FD GOV_EXP		-0.008*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.006** (0.003)	-0.006 (0.004)	-0.001 (0.004)	-0.002 (0.004)	
FD Taxrev										0.004** (0.002)
FD Trade			0.003*** (0.001)	0.003*** (0.001)	0.002** (0.001)	0.002 (0.001)	0.002 (0.001)			0.0003 (0.001)
FD openness							-0.001 (0.002)			
FD imp_gdp									0.002 (0.002)	
FD exp_gdp									0.001 (0.002)	
FD Life_EXP				-0.001 (0.004)	0.007 (0.005)	0.004 (0.006)	0.004 (0.006)	0.005 (0.005)	0.005 (0.005)	0.004 (0.004)
FD GDP_PCG					0.0005 (0.0004)	0.001* (0.0004)	0.001 (0.001)	0.001* (0.0004)	0.001 (0.0005)	0.001** (0.001)
FD TPC_GDP					0.009 (0.012)					
FD Labour_union % labour						-0.001 (0.003)	-0.001 (0.004)			
FD GC_F							0.00001 (0.002)	0.001 (0.002)	0.001 (0.002)	-0.0004 (0.001)

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Observations	50	50	50	50	29	27	27	40	40	38
R^2	0.147	0.393	0.496	0.496	0.713	0.761	0.761	0.526	0.564	0.649
Adjusted R^2	0.111	0.353	0.451	0.439	0.617	0.673	0.655	0.422	0.452	0.567
Residual Std. Error	0.006 (df = 47)	0.005 (df = 46)	0.005 (df = 45)	0.005 (df = 44)	0.004 (df = 21)	0.004 (df = 19)	0.004 (df = 18)	0.005 (df = 32)	0.005 (df = 31)	0.004 (df = 30)
F Statistic	4.044** (df = 2; 47)	9.926*** (df = 3; 46)	11.061*** (df = 4; 45)	8.665*** (df = 5; 44)	7.456*** (df = 7; 21)	8.636*** (df = 7; 19)	7.159*** (df = 8; 18)	5.072*** (df = 7; 32)	5.015*** (df = 8; 31)	7.928*** (df = 7; 30)

Note: table includes robust standard errors, clustered by country (HC1)   *$p<0.1$; **$p<0.05$; ***$p<0.01$

For our purpose, it is interesting to explore how these estimations hold when using competition law indicators as instruments, in an attempt to control for endogeneity issues not dealt with in the past.[136] We use the Antitrust indicators to extract from the USA time-series potential covariates, using data on both the USA Supreme Court and antimonopoly efforts. To capture their effects, we interacted the number of abuse of section 2 cases with a negative of the min factor for more natural interpretation (this way, both have same expected sign on markups and inequality). This new interaction term is used for a conventional two-stage least squares (2SLS) methods of equation 2 to mitigate possible endogeneity concerns. Other studies use a set of political and institutional variables as instruments in a similar setting.[137] But, as such an instrument could affect inequality in other ways besides competition, we consider the interaction of court-agency to be a good candidate instrument. This hypothesis is based on the critical role the Supreme Court plays in the federal antitrust regime, specifically in combination with the agencies' efforts of enforcement. There is no theoretical reason to believe that the number of Sherman Act section 2 cases should affect inequality except through the intermediation of the competition. In the first-stage, we regress the potentially endogenous choice of the variables in the estimation equation, on the instrumental interaction. In the second stage, we regress the dependent variable (1% income share) on the fitted values of the first stage (using R ivreg). The IV estimates are relatively similar to the FD ones (in 4 out of 7, the coefficients are statistically significant at the 5% or 10% level and positive). We also conduct the text-book tests for our instruments: A week instrument test, Wu-Hausman, and Sargan test, which resulted in no indications for problems.

Table A4. 1% Income Share, 2SLS-FD, USA

	Dependent variable:						
	FD top1						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FD markups	0.072 (0.267)	0.312* (0.183)	0.382* (0.199)	0.399* (0.203)	0.386* (0.214)	-0.117 (0.709)	-0.092 (0.606)
FD inflation	0.001 (0.001)	0.002* (0.001)	0.0004 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001 (0.004)	0.001 (0.003)
FD GOV_EXP		-0.004 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.001 (0.003)	-0.005 (0.005)	-0.010 (0.013)
FD Trade			0.003** (0.001)	0.003** (0.001)	0.002* (0.001)	0.001 (0.002)	0.001 (0.002)
FD Life_EXP				0.011 (0.007)	0.011 (0.007)	-0.0005 (0.018)	-0.001 (0.017)
FD GDP_PCG					0.0003 (0.001)	0.002 (0.003)	0.002 (0.003)
FD union%						-0.003 (0.010)	-0.005 (0.013)
FD GC_F							-0.003 (0.008)
Observations	40	40	40	40	40	27	27
R^2	0.176	0.159	0.073	0.131	0.177	0.439	0.536
Adjusted R^2	0.131	0.089	-0.033	0.004	0.027	0.232	0.330
Residual Std. Error	0.006 (df = 37)	0.006 (df = 36)	0.006 (df = 35)	0.006 (df = 34)	0.006 (df = 33)	0.006 (df = 19)	0.006 (df = 18)

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[136] For example, see Minsoo Han, *Rising Income Inequality and Competition: Evidence* (2014). Han analysed aggregated data using markups as a proxy for market power, trying to establish a link to several inequality measures, while controlling for other covariates such as openness to trade. Using a panel of 22 countries (18 developed) from 1961-2004, he found a positive effect of market power on the top 5%, 1%, and 0.1% income share and the opposite effect on the low 10% and 5% income share. He finds no influence on the 90% bottom income share. The study did not tackle issue of endogeneity.

[137] Mara Faccio & Luigi Zingales, *Political determinants of competition in the mobile telecommunication industry* (2017).

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While limited by the aggregation of the data, the analysis thus far supports the notion that diminishing competition is part of the USA inequality story. It is not to say that the upsurge of markups caused an increase in inequality.

Table A5 includes the countries assigned in the GSC of the main text. All other specifications are elaborated above and figure A2 and table A6 the placebo results.

Table A5. Countries assigned GSC, US-OECD model

United States		United States	
Austria	-0.30646165	Iceland	-1.81356886
Belgium	-1.53100242	Italy	-0.95856192
Chile	0.84350580	Latvia	-1.36026439
The Czech Republic	0.06344203	Luxembourg	0.85143039
Denmark	3.33185967	Netherlands	0.50266722
Finland	-0.20533508	Norway	-0.33421877
France	-0.15157500	Portugal	-2.58964287
Germany	0.71948316	Spain	1.63116766
Greece	2.20238187	Sweden	-0.16473656
Hungary	1.12275142	Switzerland	1.22353688
		Turkey	-4.78924035
		The United Kingdom	1.28785143

In the supplementary files, you can find data and code to see weight assign to each of the eight treated countries.

Figure A2: 10% Income share, placebo1 'legal origin', OECD
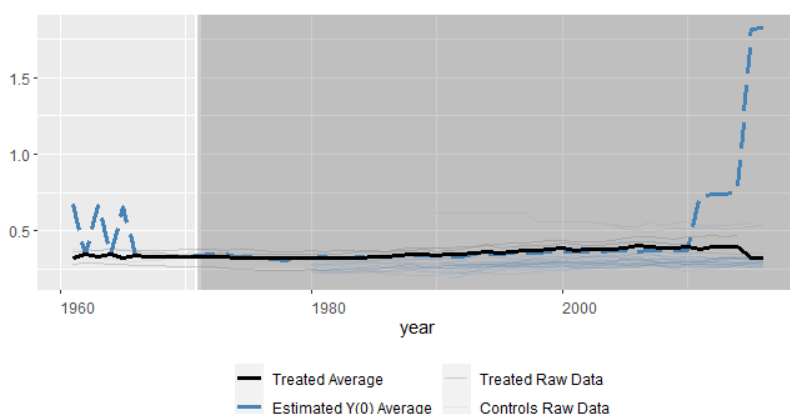
Table A6. Treatment Effect on the Treated, GSC Placebo models

	Model	Dependent Variable	ATT.avg	S.E	CI.lower	CI.upper	P-value
1	EM – LO. (Common)	top10	0.00843	0.00553	-0.01551	0.00677	0.388
2	EM – CO (British)	top10	0.008416	0.00554	-0.01543	0.00616	0.44

Table A7-A10 are further sensitivity test for the main models. First, Table A7 is the full results of Table 1 (markups and the antitrust scale). In Table A8-A9, we present the DID model results of using similarity to the USA section 2 (monopolisation) of the Sherman Act. This narrower group (2 compared to 10) is a conservative version of the similarity to the USA model. The results are similar and robust in most of the specifications. Table 10 is the GMM model of the similarity to the USA.

Table A7. Antitrust Scale, markups USA time-series

	Dependent variable:				
	log(markups)				
	(1)	(2)	(3)	(4)	(5)
lag(new_index, 10)	-0.135*** (0.014)	-0.019** (0.009)	-0.017 (0.012)	-0.020* (0.010)	
moving_a10					-0.163** (0.054)
log(lag(markups))		0.862*** (0.056)	0.767*** (0.076)	0.490*** (0.133)	0.453** (0.159)

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log(lag(markups, 2))				0.242** (0.114)	0.109 (0.163)
log(inflation)			-0.012** (0.005)	-0.012** (0.005)	-0.018*** (0.004)
log(GDP_PCG)			0.004*** (0.001)	0.004*** (0.001)	0.005*** (0.001)
log(fdi_in)			0.015* (0.007)	0.018** (0.006)	0.031*** (0.007)
log(fdi_out)			-0.006 (0.005)	-0.007 (0.004)	-0.013** (0.005)
log(GC_F)			-0.036 (0.034)	-0.046 (0.034)	-0.211*** (0.050)
log(TPC_GDP)			0.049 (0.070)	0.080 (0.070)	0.214*** (0.058)
Constant	0.345*** (0.006)	0.053*** (0.019)	0.159 (0.131)	0.175 (0.123)	0.611*** (0.163)
Observations	31	31	26	26	23
R²	0.722	0.966	0.987	0.988	0.993
Adjusted R²	0.712	0.964	0.980	0.982	0.988
Residual Std. Error	0.034 (df = 29)	0.012 (df = 28)	0.008 (df = 17)	0.008 (df = 16)	0.006 (df = 13)
F Statistic	75.153*** (df = 1; 29)	398.396*** (df = 2; 28)	155.583*** (df = 8; 17)	152.117*** (df = 9; 16)	205.002*** (df = 9; 13)

Note: *p**p***p<0.01

Table A8. Gini, similarity to section 2 (monopolisation), OECD

	(1) log_gini_mkt	(2) log_gini_mkt	(3) log_gini_mkt	(4) log_gini_disp	(5) log_gini_disp	(6) log_gini_disp
Monopolisation	0.016	0.049**	0.050**	0.071**	0.110***	0.114***
	(0.023)	(0.024)	(0.024)	(0.030)	(0.030)	(0.030)
log_lifeexp	-0.261	-0.408	-0.429	-0.741	-1.008*	-1.018*
	(0.362)	(0.422)	(0.421)	(0.453)	(0.502)	(0.513)
log_gdp_pc	0.021	0.015	0.015	0.009	0.010	0.013
	(0.036)	(0.036)	(0.036)	(0.049)	(0.048)	(0.048)
log_exp	-0.020	0.014	0.017	-0.088	-0.064	-0.060
	(0.040)	(0.035)	(0.036)	(0.053)	(0.055)	(0.056)
log_imp	0.056	0.019	0.018	0.096*	0.071	0.068
	(0.047)	(0.045)	(0.046)	(0.051)	(0.050)	(0.050)
log_unempl	0.018	0.026*	0.026*	0.031	0.045**	0.046**
	(0.012)	(0.014)	(0.013)	(0.019)	(0.019)	(0.019)
log_inflat	0.002	0.000	-0.000	0.001	0.000	0.000
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
log_inv	-0.019	0.012	0.014	-0.029	0.022	0.027
	(0.034)	(0.037)	(0.036)	(0.044)	(0.045)	(0.044)
log_gov_exp	-0.072*	-0.062*	-0.072**	-0.202**	-0.194**	-0.201**
	(0.040)	(0.033)	(0.035)	(0.076)	(0.078)	(0.079)
D.log_gini_mkt			0.356			
			(0.221)			
D.log_gini_disp						0.259
						(0.206)
_cons	0.256	0.805	0.908	2.520	3.445	3.445
	(1.590)	(1.904)	(1.897)	(2.193)	(2.480)	(2.534)
Obs.	677	677	676	677	677	676
R-squared	0.926	0.940	0.941	0.980	0.983	0.983

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table A9. Top Income Shares, similarity to section 2 (monopolisation), OECD

	(1) log_top1	(2) log_top1	(3) log_top1	(4) log_top10	(5) log_top10	(6) log_top10
Monopolisation	0.730***	0.640***	0.618***	0.350***	0.322***	0.307***
	(0.120)	(0.168)	(0.166)	(0.051)	(0.057)	(0.056)
log_lifeexp	-4.950**	-4.769**	-5.158**	-2.442**	-2.374**	-2.616**
	(2.030)	(2.235)	(2.345)	(0.945)	(1.014)	(0.991)
log_gdp_pc	0.047	0.128	0.157	0.102	0.114	0.127*

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	(0.141)	(0.167)	(0.165)	(0.068)	(0.075)	(0.073)
log_exp	0.161	0.209	0.223	0.068	0.088	0.094
	(0.177)	(0.216)	(0.185)	(0.073)	(0.078)	(0.075)
log_imp	0.014	-0.013	-0.079	0.050	0.040	0.011
	(0.186)	(0.219)	(0.196)	(0.091)	(0.096)	(0.094)
log_unempl	-0.020	-0.012	-0.002	0.012	0.011	0.015
	(0.041)	(0.045)	(0.048)	(0.016)	(0.017)	(0.018)
log_inflat	-0.002	-0.002	-0.005	-0.011**	-0.012**	-0.013**
	(0.012)	(0.013)	(0.013)	(0.005)	(0.005)	(0.006)
log_inv	0.114	0.121	0.153	0.022	0.027	0.037
	(0.143)	(0.149)	(0.180)	(0.060)	(0.063)	(0.073)
log_gov_exp	-0.212	-0.127	-0.179	-0.021	-0.008	-0.023
	(0.176)	(0.195)	(0.197)	(0.071)	(0.079)	(0.083)
D.log_top1			0.430***			
			(0.070)			
D.log_top10						0.440***
						(0.064)
_cons	18.120**	16.302*	17.876*	7.965*	7.510	8.486*
	(8.451)	(9.496)	(10.355)	(4.085)	(4.462)	(4.480)
Obs.	595	595	589	582	582	575
R-squared	0.924	0.928	0.937	0.954	0.955	0.960

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1

Table 10A includes the results for the system GMM of the same similarity to USA antitrust treatment group (figure 10).

Table A10. Gini and Income Share, System-GMM, OECD

	(1) log_gini_mkt	(2) log_gini_disp	(3) log_top1	(4) log_top10
resemb_us	0.004	0.003***	0.004	0.003
	(0.003)	(0.001)	(0.028)	(0.007)
log_lifeexp	-0.052	0.027	-0.257	-0.193
	(0.045)	(0.062)	(0.602)	(0.270)
log_gdp_pc	0.003	-0.010**	0.017	0.014
	(0.004)	(0.005)	(0.057)	(0.020)
log_exp	-0.003	-0.025***	-0.014	-0.031
	(0.006)	(0.008)	(0.099)	(0.035)
log_imp	-0.002	0.022**	0.066	0.046
	(0.007)	(0.010)	(0.086)	(0.032)
log_unempl	0.001	-0.002	0.015	0.002
	(0.002)	(0.003)	(0.018)	(0.005)
log_inflat	0.001	0.001	-0.011	-0.005*
	(0.001)	(0.001)	(0.007)	(0.003)
log_inv	-0.004	-0.017**	-0.006	-0.036
	(0.005)	(0.007)	(0.064)	(0.025)
log_gov_exp	0.028***	0.009	-0.236***	-0.067**
	(0.009)	(0.010)	(0.071)	(0.029)
L.log_gini_mkt	0.920***			
	(0.016)			
L.log_gini_disp		0.930***		
		(0.012)		
L.log_top1			0.733***	
			(0.044)	
L.log_top10				0.783***
				(0.048)
_cons	0.087	-0.056	0.810	0.704
	(0.176)	(0.237)	(2.266)	(1.019)
Obs.	676	676	589	575

Standard errors are in parenthesis

*** p<0.01, ** p<0.05, * p<0.1