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ABSTRACT

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The advance of digital technology is changing the nature of markets, enhancing the capacity of corporations to extract more consumers' surplus and lower the wages paid to workers. The rise of new technology has also diminished the efficacy of traditional laws to regulate firms and corporations. This is best illustrated by antitrust laws. With the new technology, there is greater returns to scale in production, and further, it is possible to have different components of the same final good be produced by different firms in faraway places. Unlike in earlier times the n firms in one industry, say the automobile industry, would all be producing cars, now the n firms in that industry produce n different parts of the product, thereby getting enormous returns to scale. Such markets are described as vertically serrated markets and their equilibria are characterized. Traditional antitrust law does not apply to these markets because the high returns to scale are natural and not artificially induced. This compels us to look for novel ways to regulate such markets. This paper discusses, in particular, laws that compel firms to have widely dispersed share holdings.

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1. Introduction

With the latest technological revolution, it is becoming harder to apply some of our traditional laws and regulations pertaining to product markets and also labor markets, where large monopsony power allows corporations to lower wages beyond what would prevail under competition. This is particularly true for antitrust law. With production chains that, thanks to digital linkages, span many countries and exhibit economies of scale never seen before, to apply antitrust laws mechanically could be the death knell for a nation's competitiveness and the manufacturing sector. But to refrain from using these laws with no complementary regulations brought in its place is to leave consumers and workers vulnerable to exploitation.

The present paper is an attempt to spell out this dilemma clearly. It goes back to the original ideas of Augustin Cournot and Joseph Bertrand in the early and late eighteenth century and to the antitrust revolution in the United States starting in the late nineteenth century to take stock of our current predicament. I have over the last two or three years commented on this problem in several places in a piecemeal manner. This paper draws on these[1] and talks about how to redo the theory in the light of these new technological developments and speculates about how we may respond in terms of regulation. The prescriptive part of the paper is indeed speculation, written while being fully aware that these are first thoughts and will have to be sharpened and honed before they can be used by policymakers.

2. Technological Change and Regulatory Challenge

In large tracts of traditional economics, the 'invisible hand' is treated as an ideological weapon. Adam Smith's discovery that the order that we see in society does not necessarily imply the existence of a God or a ruler who orders our food to be delivered to our dining table, and clothes to be kept ready at stores for us to go and choose from, and that much of this can happen through the implicit workings of an invisible hand that arises naturally from our urge to further our individual interests, gave rise to some of the finest research in general equilibrium analysis and economic theory but also to a large amount of overwhelmingly misleading debate on ideology. One group took Smith's theory to indicate that you can always leave decisions to the market, without the need for government intervention; and another group took that theory to be false indicating that you always need state directive and regulation.

In reality, as modern economic theory made amply clear, it all depends on the domain of the economy we are talking about. In some domains, it may be fine to leave it, largely, to individual

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[1] In particular, I draw heavily from my paper, Basu (2018).

motivations to maximize profit or utility. In others, you may need the law and regulation in significant ways, enforced by the agents of the state, to bring about order and optimality. Local food markets in villages clearly fall in the first category. The use of public goods and commons fall in the second category.

What is rarely appreciated however is that the same market that worked well once without the use of law's authority may cease to do so as a result of shifts in the underlying technology. Or, more generally, the kind of regulation that once worked may cease to do so as technology changes the strategic character of the game of life we are engaged in. In an ongoing research project of mine with Jorgen Weibull (Basu and Weibull, 2019), we try to characterize the idea of slow drift which, while expanding the production possibility frontier of human kind, nevertheless changes the strategic structure of interaction among human beings so that, left to itself with no regulation, such an economy could collapse to a disastrous outcome that is referred to as the 'dinosaur risk'.

Human society has had to contend with many such turning points in the course of history. When 2.5 million years ago our ancestors learned to make labor saving tools or when approximately 300,000 years ago they learned the "domestication of fire" these marked dangerous turning points for our history, with sudden declines in the demand for certain kinds of labor (Harari, 2011). At those times, there was no state or the law but there were norms and informal rules of behavior that had to change to convert these technological breakthroughs into advantages and higher standards of living. These changes could instead have become forces of destruction. The story was quite similar during the Industrial Revolution, from roughly the mid-eighteenth century to the mid-nineteenth. The arrival of new technology and machines to displace labor caused distress and turmoil. But as a result of new laws and regulations—such as Britain's various factories acts, explicitly meant to protect workers, and the novel idea of a sustained income tax from 1842, the Industrial Revolution became a blessing that led to higher growth and, ultimately, a higher living standards. It is also no coincidence that the period of the industrial revolution coincided with the period of biggest breakthroughs in economics, from Adam Smith's Wealth of Nations in 1776, to the marginalist revolution led by Stanley Jevons (1871) and Leon Walras (1874) in the late nineteenth century.

It is arguable that we are at a similar juncture today with new digital technology turning markets on their heads and causing the relative demand for labor to drop[2], and prompting a political backlash and an increase in populism (Rodrik, 2017). The way the mastering of long-distance sea travel in the late 15th century changed the landscape of the world economy and polity, bringing in new forms of trade and prosperity, but also ushering in the age of colonialism, today is a time of new opportunities and also new challenges. It is time to re-think the foundations of our discipline and also the modes and nature of market regulation. This paper focuses on a segment of the regulatory challenge, pertaining to antitrust laws and their implementation in the face of advancing digital technology and labor-saving inventions. It is, therefore, a small contribution to a large agenda of research.

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[2] See Autor, Katz and Krueger (1998), Karabarbounis and Neiman (2014), Basu (2016)

3. Antitrust Century

Antitrust law, even in the best of time, was a controversial policy instrument for improving market efficiency and fairness. The pioneering work on this began in the United States, with the enactment of the **Sherman Antitrust Act** in 1890. The theory of oligopoly and monopoly, though they had been given mathematical structure several decades before that, starting with the pioneering work by Cournot (1838), was still not a part of the regular discourse in economics. The antitrust law movement grew more out of political activism, to protect the hapless consumer, than any formal theoretical understanding of markets. As mentioned above, there is a case for being similarly concerned about the hapless worker. Monopsony being a counterpart of monopoly, it is not surprising that the same exploitation of consumers buying products and services from firms that often occurs can and do happen to workers supplying labor to firms and corporations[3].

It was never clear whether its primary motivation was to promote efficiency or fairness. It was recognized much later, at the time of enacting the **Robinson-Patman Act** in 1936, that the most exploitative monopoly, namely, one that perfectly price discriminates across consumers, may be as efficient as a perfectly competitive market (see Basu, 1993). Of course, the same applies to the exploitative monopsony, discriminating across workers. Likewise, just as firms can collude to raise prices on workers, they can collude to lower wages for the workers they hire. In 2010, the US Justice Department brought a case against Apple, Google and other tech firms in Silicon Valley, charging that they were colluding by not poaching on one another's workers, thereby helping keep wages artificially low, which amounted to a violation of section 1 of the Sherman Act (see Marinsecu and Posner, 2019).

For the analytical part of this paper I shall be dealing with monopoly and oligopoly, though the same argument carries over to monopsony, oligopsony, and the exploitation of labor. To understand the above remarks, consider a standard demand curve as shown in Figure 1, below. Assume that the marginal cost of production is constant at k. Then, as is well known, the competitive equilibrium is at the point marked C. The amount produced will be Q_C and the price charged will be the same and the marginal cost of production, k.

If, on the other hand, the market was being provided for entirely by a standard monopolist, the price would be higher, at p_M, and the quantity sold would be Q_M, as illustrated in the Figure 1. Since the competitive equilibrium is efficient, standard monopoly, which supplies less than a competitive industry, clearly results in under production. It is in this sense that monopoly is known to be inefficient.

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[3] While the exploitation of laborers has been a subject of long-standing interest to economists, it is heartening to see a recognition of this in the new legal literature in the context of antitrust law (see Krueger and Ashenfelter, 2017; Naidu, Posner and Weyl, 2018; Marinescu and Hovenkamp, 2018; Marinescu and Sunstein, 2019). Sunstein (2018) refers to this as the "New Chicago School in town".

Now suppose a certain market is served by one firm, the monopolist, and so the equilibrium is at the point marked M. There is inefficiency, as already seen. Interestingly, however, there are two ways to get to an efficient outcome. The first is to let in many more firms to enter the industry, as is typically attempted by antitrust laws and pro-competition laws. But what is not always appreciated is that there is another way to get to the efficient outcome—to enable or encourage the monopolist to become more exploitative, by discriminating across consumers perfectly. This in effect means that for each unit of the good sold, the monopolist extracts the highest price a consumer is willing to pay. In other words, the consumer's surplus is converted into the monopolist's profit. In such a case the monopolist is able to collect the entire area beneath the demand curve as revenue. Such a monopolist will sell Q_C units and collect a total revenue equal to $OACQ_C$. Since the cost of producing this is $OkCQ_C$, the monopolist's profit is kAC and the consumers earn zero surplus.

Figure 1
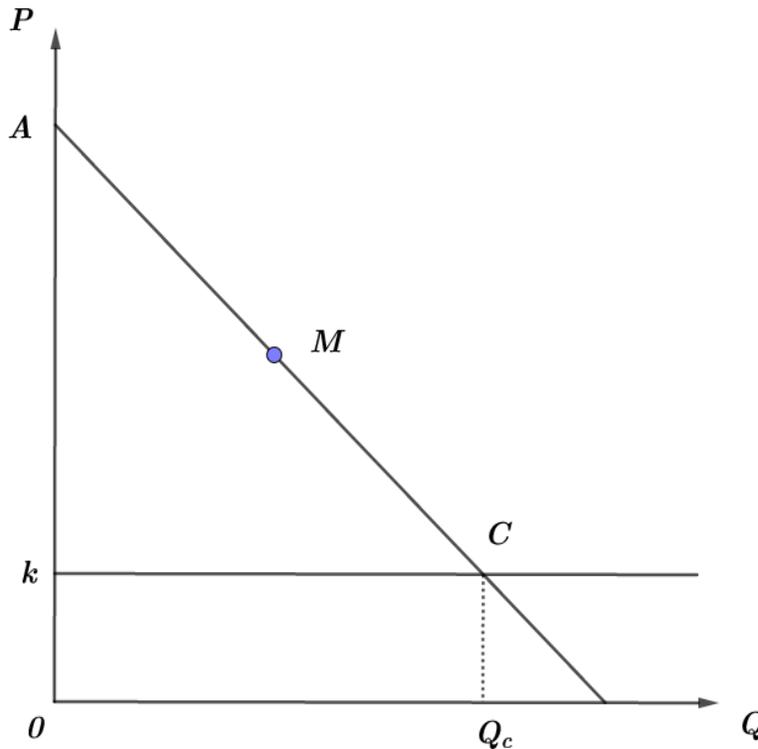
In brief, perfect competition, where consumers do well for themselves or perfectly price discriminating monopoly, where consumers are totally exploited, are both efficient outcomes. If our sole aim is efficiency, as is the case with many traditional economists, we should be indifferent between these two outcomes. Therein lies a big problem with conventional antitrust law as conceptualized by the 'neoclassical' law and economics profession that emerged in the 1960s (see Basu, 2018a for discussion). Hence, if our main aim was to achieve efficiency, a

monopolist should be nudged either to become competitive or more exploitative, using price discrimination to extract all consumers' surplus from those buying the good or the service in question. As noted above, these same comments apply to the labor market and the monopsonistic power of corporations hiring labor.

The morally unacceptable quality of this view becomes evident if one considers an extreme case, such as bonded labor or slavery. As a system of labor, slavery was in all likelihood 'efficient'. By pushing one group of people, namely the slaves, to the wall, their owners were maximizing their own gains to the maximum extent possible. The result is Pareto optimality. It is not possible to make any person involved in this sinister system better off without making anyone else worse off.

Increasingly, economists who came to dominate the field of law and economics, certainly since the 1960s, emphasized that the main purpose of antitrust law was to promote efficiency, quite unmindful (or uncaring) of the fact that extreme exploitation can also promote efficiency. Fortunately, the economics profession seems to have now moved away from this Chicago school paradigm[4]. I shall return to these two ways of getting to an efficient outcome later in the paper.

Turning to a different matter, it is interesting to note that our contemporary dilemma, namely, that the mechanical application of competition laws can do grave damage to industry had been encountered earlier in a rather interesting way. This is captured by the interesting history of the United States' **Webb-Pomerene Act 1918**.

The years prior to and during World War I were a time of soul-searching and questioning globalization, akin to what is happening now. There were dissenting voices during World War I expressing concern that the United States was unable to make enough profit out of foreign consumers, thanks to the restraining effect of these anti-monopoly laws, which were meant to protect all consumers. These were times of xenophobia and some of the concerns aired stemmed from this. The Federal Trade Commission which took office in 1915 was entrusted with surveying the situation and coming up with policy recommendations. They hit upon a solution, one which was, effectively, an amendment to existing antitrust laws. The outcome was the **Webb-Pomerene Act** of 1918. In essence, this was a law that allowed firms and corporations to collude and hike prices as long as they could show that the bulk of their good were exported. in other words, the consumers they were exploiting were foreign consumers and not the domestic ones protected by the **Sherman Act 1890** and **Clayton Act 1914** (Diamond, 1944).

We are at a similar juncture today not because of foreign competition but because of the massively increasing returns to scale, made possible by the rise of new technology. It is arguable that the steady and, in recent years, sharp changes in technology, especially the rise of digital technology, is causing inequality to rise, and the wages of workers to be depressed. If we do not

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[4] This is argued cogently is a recent essay by Stiglitz (2019) where he points to this dichotomy and argues that we must return to the use of anti-trust law to curb inequality instead of being focused solely on efficiency, as was the case under the neoclassical school.

want this to spin out of control we need to rethink our regulatory structure and even the foundations of economics as deeply as we did during the Industrial Revolution.

In the sections that follow I argue that the antitrust regime, which began in 1890, served reasonably well for a century, but is beginning to falter now, especially in the United States. The vertical mergers we are seeing today in the information technology industry ought to be more aggressively stopped using the existing antitrust law. The United States could for instance borrow some ideas from Europe on how to do this better. Further, the price discrimination that is occurring today both in the labor market and product market leading to the exploitation of, respectively, workers and consumers is unacceptable. This may require the Robinson-Patman Act to be amended to extend its reach. However, even with all this, it is likely that the march of digital technology and increasing returns to scale will make it harder and harder to protect consumers and workers and achieve greater equity by means of antitrust law alone. We will have to think of novel forms of regulation. It has been a little more than a century of antitrust legislation; and though we must not let the regulators off the hook for not doing a better job, it may also be that we are reaching the end of the antitrust century.

This immediately gives rise to questions about inequality and how its excesses can be curbed. As noted above, the original motivation behind the Sherman Act was to prevent arbitrary profiteering and to protect the small players and consumers on the market. If this law is now revoked because increasing returns to scale renders it irrelevant of a hindrance, how do we ensure fairness and equity on the market? For that, I believe, we need a different set of laws, those pertaining to direct action to promote greater equality and different kinds of profit sharing.

Before we go into these details it is useful to spell out in words what the problem is with antitrust law in today's world.

4. Serrated Industries: A Description

While Adam Smith (1776) and, later, Allyn Young (1928) were aware of the eventual arrival of increasing returns to scale and what this might do to markets, this was not a major concern till recent times. As a result of the relentless march of technology and the start and advance in digital connectivity, which allows us to ship fractions of a large project to distant lands, we today have economies of scale of a magnitude that was almost unimaginable even a few decades earlier. Among the many implications of the digital economy is the fact that search costs have gone down dramatically (see, for instance, Goldfarb and Tucker, 2017). You can be a producer in a small town in Vietnam and be known to those who need your product in Detroit.

This has had one important consequence. In producing any slightly complicated good for consumers—laptops, cars, toys or music systems, for instance—it is now possible to consider components of the final product separately, and have them produced in different places with relative advantages and that too on a massive scale so that each component is much cheaper than would have been the case if everything was produced under one roof. I refer to this as a

'vertically serrated industry' or simply a 'serrated industry' (Basu, 2018). This will be defined more formally in the next section.

Hence, the age we are entering is one in which there may still be thousands of firms involved in producing the same product but not because each of these firms produces the final good from start to finish (like in a traditional Cournot, 1838, or Bertrand, 1883, oligopoly or competitive model) but because each firm produces some tiny part of the final product. Take the example of the car industry. A standard oligopoly is one in which there are n producers of cars. A vertically serrated industry is an industry in which n firms may still be involved, but with one producing all the gears, one all the ignitions, one all the wheels and so on. To make matters worse these firms may be scattered around the world. One firm in one nation with cheap labor may be the master wheel maker and another firm in another nation with sophisticated engineers may be the master gear manufacturer, with assembly taking place in another nation.

In the traditional oligopoly theory that comes down to us from Cournot's celebrated work in 1838, we know exactly how to characterize an equilibrium for an industry with n producers, for each n. If n is 1, we have a monopoly, if n is 2, it is a duopoly. As n increases and goes towards infinity, we approach the competitive equilibrium, which we know from the First Fundamental Theorem of Welfare Economics, is Pareto efficient.

But how should one characterize an equilibrium in a serrated industry? The best way to do it is to, first, characterize a serrated industry formally. Once that is done, I propose to use the fundamental equilibrium idea which underlies both the contributions of Cournot and Bertrand, namely that of a Nash equilibrium.

If this is done carefully, we get a surprising result. When n = 1, that is, there is only one firm producing cars (which means the full car is made by one firm), the outcome is, of course, the standard monopoly equilibrium. But when n = 2, in a serrated story this is a very different situation from n = 2 in a standard oligopoly. In a standard oligopoly, this means a duopoly. In a serrated industry model this means there is one firm that produces one part of the car, say, the front half, for all the cars being supplied, and another firm producing the other part, the rear half of the car, for all the cars. Assume that the assembly happens automatically and costlessly. In this case, the Nash equilibrium, far from moving from monopoly towards the competitive equilibrium, now moves in the opposite direction, with a smaller supply, resulting in a worse deal for consumers, with shrinking consumer's surplus, and also exacerbating inefficiency. This opens up an array of interesting questions and modeling options.

The next section illustrates these possibilities. Once this is done, we can see the problem of using conventional antitrust law to help consumers or to promote efficiency, which then leads to the following section which speculates about the kind of law we will need in this new digital world.

5. Adapting Cournot: A Model of Serrated Industries[5]

Consider a standard monopoly producing some good, say cars. As we move towards competition, the number of firms producing cars increases. There is, however, another way in which we can have many firms be involved. As discussed above, we can have one firm producing wheels, another gears, another brakes, and so on. This is what I call a (vertically) serrated industry.

As technology advances and economies of scale increase, it is natural that we will move towards greater serration. Each of the, say n, components of the final product will be produced by one firm and components will be ever more finely defined[6]. Let the aggregate demand for cars be given by X, when the price of cars is P, and A > 0 and B > 0.

$$X = A - BP \qquad\qquad (1)$$

Suppose there are n firms producing n parts of the car. I shall make some strong symmetry assumptions purely for ease of analysis. Suppose firm j produces a certain component of the car at a cost of $c = c(n)$. Hence the cost of producing a car is $nc(n)$. It is assumed that fewer the tasks a firm does, the better it becomes at it. That is:

$$\text{If } m > n, \text{ then } nc(n) \geq mc(m). \qquad\qquad (2)$$

Assume firm i chooses a price p_i for its component. The competition, in other words, is over prices. Each firm tries to gouge out a bigger chunk of the total profit by pricing its component suitably. In a standard Cournot oligopoly, firms compete horizontally by taking shares of the product market. Here the competition is vertical; hence the term 'vertically' serrated industry. The final price of a car will clearly be:

$$P = p_1 + p_2 + \dots + p_n .$$

Hence, the profit function of firm i is given as follows, where π_i denotes profit earned by firm i:

$$\pi_i = [A - B(p_1 + p_2 + \dots + p_n)](p_i - c).$$

A vertically serrated market is a game in which each firm chooses a price for its component. Maximizing profit gives us the following first order condition for player i.

$$A - B(p_1 + p_2 + \dots + p_n) - B(p_i - c) = 0 \qquad\qquad (3)$$

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[5] This section is drawn from Basu (2018).
[6] Models with similar results have been derived in the literature: see, for instance, Amir and Gama (2013). This is all a part of the strategic complementarity literature in industrial organization theory: see Singh and Vives (1984) and Vives (1990). There is another likely direction in which markets are likely to move with technological change. This is greater entry deterrence (Dixit, 1980) but I stay away from that here.

We have n equations like (3). Given the symmetry of the model it is obvious that when we solve all the n equations we will get:

$$p_1 = p_2 = \ldots = p_n \equiv p^*.$$

Inserting these in (3) and using P* to denote the price of the final product ($P^* \equiv np^*$), we get:

$$P^* = \frac{n(A+Bc)}{(n+1)B} \tag{4}$$

It is easy to see, if n = 1,

$$P^* = \frac{A}{2B} + \frac{c(1)}{2} \tag{5}$$

Recall c(1) is the total cost of making a car. Note (5) depicts the standard monopoly equilibrium. This is illustrated in Figure 2 in which the line is shown as $\alpha\beta$ depicts the demand curve and c(1) is the marginal cost of producing each car, and the equilibrium occurs at the point marked δ.

Starting from monopoly if we move to a standard oligopoly and keep increasing the number of firms, in the limit, as is well known, the equilibrium goes to the point marked 'competitive equilibrium.' But in a serrated market, as n increases, P increases. The equilibrium moves towards the price equal to A/B. This is depicted by the point marked α in the figure. In essence, as vertical competition increases, the equilibrium moves away from the monopoly equilibrium in the opposite direction. In other words, consumer welfare decreases.

To see this formally, recall c is a function of n. Hence, (4) can be written equivalently as:

$$P^* = \frac{nA}{(n+1)B} + \frac{Bc(n)n}{(n+1)B} \tag{6}$$

From (2) we know that as $n \to \infty$, $nc(n) \to 0$. Hence, as $n \to \infty$, $P^* \to \frac{A}{B}$.

Therein lies the problem for the consumer. With technological progress, there will be a tendency for markets to get even more exclusive, with prices rising and consumption falling. One reason why this may not happen is that among the n producers it is likely that not all will be playing the game as described above, choosing a price, and sitting back. Some will no doubt put on the mantle of a standard monopolist who influences quantity along with the price.

If we assume for instance that the nth firm in the above industry is the retailer who assembles all the parts together and covers the last mile to the consumer, it is easy to show that the equilibrium will be at the standard monopoly equilibrium, that is, at δ, half-way between where the demand curve touches the vertical axis and the cost curve. For this to be formally modeled we will need to introduce the capacity for this n[th] firm to use strategies which go beyond the pure choice of a price for each unit of its action.

Modern technology and the availability of consumer information also allows for discrimination of a kind that may not have been possible earlier. Sooner or later some of the producers will learn the art of price discrimination. Once that happens, even as n keeps increasing the number of cars produced will be the same as in the competitive equilibrium, but with one additional caveat— each consumer will be made the pay the highest price he or she is willing to pay. In other words, (assuming, purely for reasons of analytical simplicity, that the income effect of the final product is zero) the producers, one or more, will take the entire triangle below the demand curve and above the line k, as profit for themselves. The consumers will have many cars but they would have paid up every penny they were willing to pay.

Figure 2
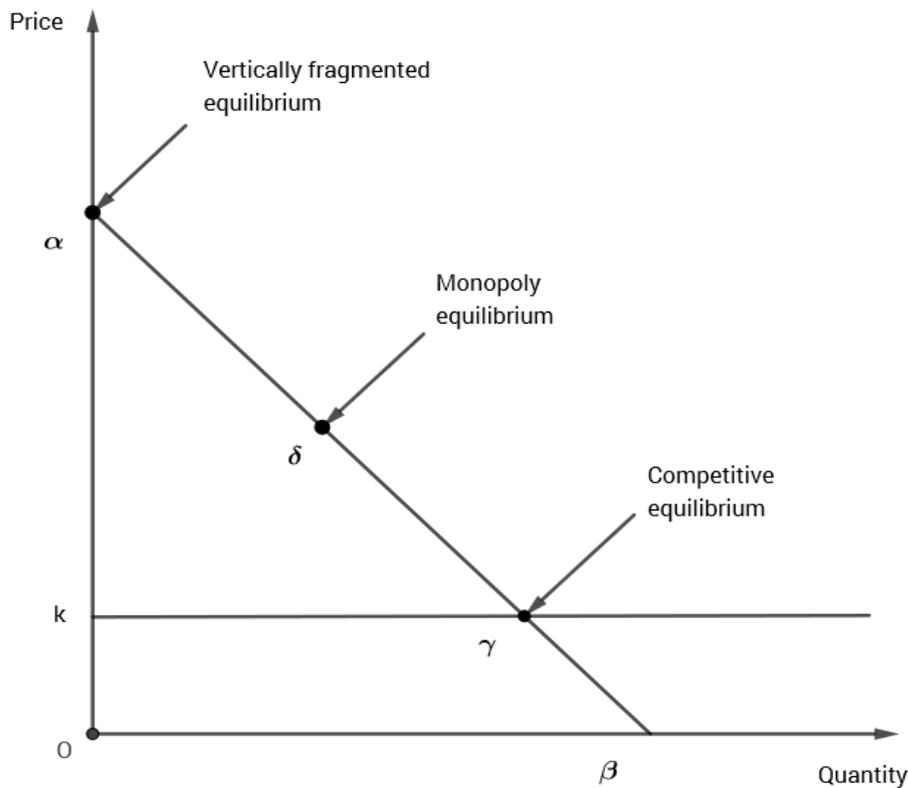
A formal proof of this is easy to give by assuming that the nth firm in the car industry, say the final retailer, is able of price discriminate. Hence, while other firms choose their respective prices, firm n chooses a function $\phi(q)$, which says that this firm will charge a price of $\phi(q)$ for the act of retailing the qth car that he sells. In such a model, equilibrium occurs at the competitive

equilibrium, marked γ in Figure 1, with the qth consumer being charged $p_1 + p_2 + \ldots + p_{n-1} + \phi(q)$. Hence, the entire consumer surplus is picked up by the retail firm. The nth firm will select:

$$\phi(q) = \frac{A}{B} - \frac{q}{B} - nc(n).$$

In brief, we have entered a world where small players—be they consumers or laborers will either see a restriction of the market with prices rising or increasing price discrimination which extracts all their consumer surplus.

6. The Need for Regulatory Overhaul

The phenomenal success of the retailers in today's world may have something to do with the above model. Given the argument sketched above, it is not surprising that price discrimination is rampant in today's world. Of course, this has to be under camouflage because most nations have anti price-discrimination laws of some kind. In the US, the **Robinson-Patman Act,** 1936 is supposed to deter price discrimination. But luckily for big corporations, this is one of the most poorly implemented laws. There is a good reason for this. There is a variety of ways to price discriminate across consumers without admitting to doing so. We can use the traits of consumers and for each vector of traits set a price. So for all those who live on the upper west side of New York, live in a high-rise, and use a certain kind of computer to place an order will have to pay a certain price. And so on. By this method, without having to name a consumer, you can price a commodity virtually for that consumer.

We can charge a rare air-traveler a very higher price per ticket and make it very cheap for those who fly a lot (which is called a frequent flyer program). We can vary the price of a taxi ride depending on what kind of phone you use to call the taxi. Prices can be made vary depending on whether you are a good searcher or an impatient searcher. All these are common practices, where price discrimination is practiced under the guise of product differentiation.

In labor markets also something similar is happening, salaries are varied through subtle means to extract much of the surplus the laborer would have got by working. In areas where the poor live, wages are low. In many jobs there is open wage-bargaining, which allows employers to tailor the wage they pay to different workers for the same job.

So with the march of technology and with greater vertical serration of the markets, we are moving to equilibria where either prices are so high that most people are excluded from buying the product or they face a price discriminatory market whereby their consumer surplus is taken out of their hand. They may buy a lot and workers may work a lot but the prices they pay for what they buy, and the wages they receive for their work leave them with little surplus.

A part of the rise of inequality globally is caused by this. It is not a result of rising avarice or people getting more mean (though they well may) but the advance of technology changing the shape of

market equilibria, as described in the above section. One sees in rich nations increasing evidence of bilateral bargaining, which allows sellers to charge different prices of different consumers. This happens nowadays in the United States whether one is buying a car, an air ticket or even medical services. The bazaar economy that once used to be the preserve of poor countries and village markets has at last arrived in rich nations.

The big policy challenge is: what should we do about this? Using the Sherman Act and forcing markets to be horizontally competitive (that is competitive in the traditional way) is to forego much of the benefits of technological advance, which has resulted in increasing returns to scale. If for each product, we insist that there has to be thousands of producers each supplying a small fraction of the demand we would forego all the benefits of modern technology and push society back to primitive times. Also, it is arguable that the Sherman Act does not apply in such situations because this act is meant for artificially-created monopolies and not natural monopolies which occur by the very nature of technology.

More specifically, a firm must control at least 70% of the market to be considered a monopoly, and to be considered guilty of monopolization, it must practice one or more "exclusionary practices." Whether something is a deliberate exclusionary practice is, of course, a questionable matter and, not surprisingly, the law has given rise to a lot of dispute (see Hovenkamp, 1999, for a more detailed discussion). What I just showed, however, is that even if the law did apply to the kind of monopolies arising today, using it to create many competing firms would be undesirable. In brief, given the changing nature of modern industry, the Sherman Act and, in fact, all conventional antitrust laws have diminished roles to play.

This leads me to the conclusion that some of the problems of large firms that Stiglitz (2017) and many others have written about can no longer be solved by using our traditional antitrust laws and we have to look beyond these to novel interventions. It is worth stressing, as pointed out above, that the regulators in the United States are not using the existing antitrust laws as effectively as they could and should. But even if they did so, the existing laws are turning out to be quite inadequate for today's world. In vertically serrated industries which are becoming more and more common, this problem will become even more acute. It is time to move away from reliance on antitrust and competition laws to the extent we had in the past. This relates to the point broadly made in Basu and Weibull (2019), where we show with an illustratively constructed game how at times the ground beneath our feet may shift slowly, which while expanding the production possibility frontier, also changes the strategic character of the game, thereby creating a risk that unchanged behavior can cause a collapse. The slow shift may make us impervious to what is happening. But it is important for us to put our research hat on, understand the shift and think outside of the box, to develop new regulations and new social conventions, where they may not have been needed before (and in come case remove old laws and regulations).

There is another reason why conventional antitrust laws that prohibit collusion among firms does not work well. It is true that the Sherman Act prohibits "conspiracy, in restraint of trade or commerce." However, as the emergence of the theory of repeated games made clear, what can be done by firms by sitting together and conspiring can arise naturally among a group of firms

playing the market repeatedly (see discussion in Basu, 1993). The collusive behavior can be a natural subgame perfect equilibrium with no need for explicit contract to collude. What allegedly happened among the Silicon Valley tech firms, or among firms employing low-skilled workers to make sandwiches, namely, using noncompetes to keep wages low[7], could have happened naturally with no conversation among the firms[8]. This creates a fundamental problem in defining what constitutes collusion among firms. This is often overlooked in the law and economics literature that argues that to prevent exploitation of consumers and workers all we need to do is to apply our antitrust laws more diligently.

In the light of the above discussion, it is arguable that if, in the face of the rise of digital technology and changing landscape of market competition, we persist in relying on the existing laws and regulations, including the antitrust laws, and simply try to be more effective in implementing them, the outcome will be an undesirable equilibrium. It is possible that global GDP will keep rising, but inequality will also rise in step, in fact sharply, with a few owners of firms cornering all the benefits, with a mass of population being left out of and even impoverished by the march of technology. What we need is a different set of laws to counter this and also social conventions for different norms of behavior. My focus here is however not on social norms and conventions but the law.

If monopolies or oligopolies with few firms will be the market structure of the modern, vertically-serrated industries, how can we ensure an equitable society? A natural idea that jumps out is that even if a few firms earn huge profits, there is no reason why a few persons should earn huge profits. For that, we have to have laws which compel firms to diversify their share-holding. In short, the key is to ensure that the shares in each company are widely held. A monopoly of production must not mean a monopoly of income. Thus, the dismantling of antitrust laws, as suggested in this paper must be accompanied by new laws mandating a more radical dispersal of shareholding within each company. Not only will there no longer be a majority shareholder but shareholding in each company will be much more granular. How granular? How do we restrict buying and selling of shares so that they do not end up with a few individuals holding a disproportionate about of a firm or corporation? These are questions which will need careful examination and the laws will have to be drafted with attention to details. The main point here is to note that once we have such a law, we will not have to worry about the fact that monopoly profits will all go into a monopolist's hands. The profits will indeed accrue to one firm. But the firm being widely held, the profit will accrue to many individuals. The details of this will need a

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[7] See 'Engineers Allege Hiring Collusion in Silicon Valley,' by David Streitfeld, in **New York Times**, February 28, 2014; and 'When the Guy Making Your Sandwich has a Noncompete Clause,' by Neil Irwin, in **New York Times**, October 14, 2014.

[8] This is clearly recognized by Hay (1999) and discussed in the context of actual cases in the United States. Subliminally, this problem was sensed even earlier and did cause challenges to the implementation of the Sherman Act. As Kwoka and White (1999) point out in their introduction, as early as 1911, the US Supreme Court pointed out in the *U.S. versus Standard Oil of New Jersey* and *U.S. versus American Tobacco Co.* cases that the "rule of reason" ought to be applied to such cases and the "courts must look beyond just structural conditions and also consider behavior and intent".

lot of thought to be worked out well. Every intervention has unexpected fallouts and it is important to try to think through these.[9]

One specific problem that can nevertheless arise and deserves comment here is that a few individuals can hold few shares each in each firm but they can do this for so many firms and corporations that they become disproportionately rich anyway. With falling economy-wide wage shares and rising profits, this will result in very large profits accruing in a few hands even as we ensure that for each corporation shares are widely held. To correct this, we need a second intervention, this one at the level of the nation and not just the firm. The idea is to have some profit sharing at the national level. In brief, some fraction of profits in society should accrue to ordinary people, including workers (employed or unemployed).

The challenge is to create a blueprint for an equitable society that is viable. History is replete with systemic shifts that began with the right intentions but ended up with a few people capturing both political power and wealth. The clue is some form of profit sharing while respecting the laws of the market. We have to recognize that the market incentive and the profit motive are important drivers and must not be glossed over or, worse, centralized. What is needed is an intervention that respects this and still curtails inequality. So the suggestion is for a minimal profit-sharing within the nation, that is, to give all human beings a right to a certain fraction of the nation's profits. This idea has been around for a while and variants can be found in the writings of Weitzman (1984), Steiner (1994), Hockett (2008) and, recently, Matt Bruenig (2018) in a **New York Times** OpEd. With the share of wages in society falling steadily, and the share of profits and rents rising, in step with advancing technology and the creation of digital platforms for trade and exchange, some universal basic profit-sharing is critical.

Basically, what I am proposing is the twin dispersal idea: No firm must be disproportionately owned by one or a few individuals and a fraction of the nation's shares should be widely dispersed. So as firms cut their demand for labor and profits rise, many individuals share these higher profits and further a part of these profit ends up with the workers, who own a share of the overall profits in the nation; and every time a worker is displaced by a robot, the workers' wages do not fully become the profit of the owner of the robot.

These are fledgling ideas that will have to be carefully worked out before the can be actual policy. It must be realized that human ingenuity is immense. For every law there will be action to circumvent its intents. Good drafting of the law requires anticipating what these counter actions will be and to have provisions to minimize them; and all this will have to be done making sure that market incentives do not get damaged.

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[9]For an interesting critique of dispersed shareholding as strategy to counter the challenge of our new digital age, see Shroff (2018), who argues that the crux of the problem in India is the state-business nexus, that is getting deeply embedded in India's polity. There is also the possibility that dispersed share-holding will dampen the spirit of innovation. This may slow down growth.

To see some of the challenges that will no doubt have to be addressed consider executive pay in companies. Once profits are dispersed widely by law and the CEO is unable to take a lion's share of it a natural tendency will be to increase the salaries of the top echelons of a corporation so that a part of the profit is indirectly siphoned off as salary. Further, what I have suggested are policies to allow industries to flourish and yet not have profits heaped on a few plates. But there is a global part to this that I do not address in this paper.

For all changes in regulation, there is invariably response from individuals and corporations, trying to navigate or even circumvent the new laws. I have argued in Basu (2018a), that this is bound to be an inexorable process since human ingenuity is endless, with every new law provoking new, and often unexpected strategies. The best we can do is to anticipate some of the reactions. In this case, some of them are evident enough. As we try to set limits on inequality, there will be a tendency on the part of individuals to garner consumer's surplus, bypassing higher cash incomes. One way to do this is barter. If Picasso gives one of his paintings to Stravinsky and Stravinsky, in turn, composes a musical score especially for Picasso, both could be vastly better off. Indeed, even in current society, especially among the very poor and very rich, there is much more barter or exchange of favors than most people, including trained economists, realize. I would expect this to increase with the new regulatory model suggested here.

Further, groups will form to ensure that in their locality and for their collective interests, there are better public goods—more parks, cleaner air, better street lighting, and so on. This will enhance the group's well-being without showing up as individual incomes.

A concomitant of this is inter-country differences. I have not commented on this in the present paper. Some profit-sharing and easing up of antitrust laws within each nation can, as this paper tried to show, curb some of the social ills which brought us to our present predicament in each country. But inter-country inequality can increase, as some nations do better in solving their internal problems. This can cause migration and refugee flows, which can further fuel protectionism. In working out the details of the new regulatory framework, we will have to anticipate some of the above problems and work them into the law. In particular, the problem of inter-country policy coordination and some minimal global rules of engagement are important matters that we cannot escape in today's globalizing world[10].

This was beyond the scope of the present paper, not because it is not important but because I have no solutions to offer at this time. Clearly, it should figure prominently in our future research agenda.

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[10] For an engaging account of this challenge, see Stiglitz (2015, and 2017a, Chapter 4).

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