



Google and Alibaba's Different Stock Performances after Antitrust Investigations, the Reasons and Enlightenment

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ABSTRACT

Platform monopoly has attracted wide attention from politicians and the public. The European Commission has made unremitting efforts in platform antitrust enforcement in the last decade, but together with antitrust investigations, the stock prices of platform giants like Google and Facebook keep breaking their highest points. At the end of 2020, the Chinese government also started antitrust investigations towards platform companies like Alibaba. In contrast, the stock price of Alibaba crashed and lost more than half of its market value. By analyzing their CAR, we proved that the stock performance of Alibaba is significantly worse than Google after their most serious antitrust investigations. The difference reflects investors' different expectations of the European Commission and China's antitrust enforcement. A noteworthy problem then comes out: While the Chinese government is seriously strengthening platform antitrust and putting forward reforms in platform regulation, is there any authority that is able to effectively regulate the international platform giants and maximize the welfare of their users worldwide?

Keywords: Platform, Antitrust, Google, Alibaba

JEL Classifications: L160, L440, F320

1. INTRODUCTION

Since the 21st century, platform economy has gradually attracted people's attention. In a ranking list published by PwC in 2021, seven out of the ten biggest companies in the world are platform companies, including APPLE INC, the biggest company in the world, MICROSOFT, AMAZON, ALPHABET(Google) and META(Facebook), ranked from third to sixth, then followed by two Chinese platform companies, TENCENT and ALIBABA. Not surprisingly, together with the growth of these platform giants, platform monopoly is also becoming a hot issue.

Since 2010, the European Commission has been very active in platform antitrust enforcement. It has started many investigations toward platform giants like Google, and the investigations often result in serious penalties. For example, the commission fined

Google €2.42 billion for giving illegal advantage to its own comparison shopping service on 27 June 2017. On 18 July 2018, it fined Google €4.34 billion for illegal practices regarding the Android mobile devices, on 20 March 2019 another €1.49 billion fine for abusive practices in online advertising was also announced. On 10 November 2020, the Commission sent a Statement of Objections to Amazon for the illegal use of seller data. On 4 June 2021, it opened an investigation into possible anticompetitive conduct of Facebook. The cases are not closed yet and punishments may come out in the near future.

But did those antitrust enforcements cause any trouble to the platform giants? In the last 10 years, platform enterprises still achieved rapid growth in their profits and stock prices. The revenue of Google was 46.0 billion in 2012, which reached 182.5 Billion in 2020. The net profit grew from 10.7 billion in 2012 to 40.3 billion in 2020, and the stock price grew from 326.8 in 2012 to 2909.5

in 2021. Other platform companies like Apple and Facebook also exhibited significant growth.

Since the end of 2020, the Chinese Administration for Market Regulation also started antitrust investigations toward the platforms in China. Unlike the antitrust investigations in Europe, the investigations in China didn't take years to finish. Four months later, the result came out and Alibaba was fined 18.2 billion for its illegal conduct. As soon as the market got the news about the investigation, the stock price of Alibaba crashed, a -13.34% daily return was documented on 24 December 2020. Until December 2021, the price of BABA reached \$108.70, compared with the price of \$256.18 before the antitrust investigation, Alibaba has lost more than half of its market value.

The different performances are obvious, but since the events happened in different years, it's possible that the change in the market environment caused the difference. In order to remove the influence of the market index, we use a CAPM model to calculate the Cumulative Abnormal Return (CAR) of GOOGL and BABA. The abnormal return, which is free from the market index influence, also proves that the performance of BABA is much worse than GOOGL's performance, especially after the antitrust investigation started.

Besides the stock performance, the reactions of Google and Alibaba are also different. Google always chooses to appeal after the European Commission's penalty, its appeal upon the €2.42 billion fine just got rejected in November 2021. In contrast, Alibaba accepted the penalty and apologized in public immediately after the announcement in April 2021. The voice of academia is likewise contrasting. After the European Commission's investigations, especially after it fined Google €2.42 billion in 2017, there is a huge debate upon the rightfulness of antitrust penalty. Many researchers hold the opinion that antitrust enforcement will do little help to European customers, and stand against the European Commission. After the Chinese administration's punishment on Alibaba, most researchers recognize the case as a start of platform antitrust enforcement in China, and predict that more actions upon platform antitrust might follow.

These differences indicate that the European Commission's antitrust enforcement against international platform giants and the Chinese government's antitrust enforcement against Chinese platforms are facing different situations. The European Commission's regulations on the international platform are much harder, facing obstacles from numerous sides, while the Chinese administration obviously has enough political power to regulate the Chinese platform companies. In fact, a reform in platform antitrust and platform regulation is happening in China, which includes the update of the antitrust law, and drafts to set up new rules for the platforms. If the drafts pass, the platforms will not only face tighter regulations, but also be required to take more social responsibilities.

To better explain the sharp contrasts, and illustrate the difficult situation faced by the international community on platform antitrust, we introduced some obstacles the European Commission faces, and some progress of the reform upon platform antitrust in

China. In Chinese academia, most scholars hold a positive attitude in strengthening platform antitrust enforcement and platform regulation, several reasons supporting this position are listed.

2. LITERATURE REVIEW

In this section, we reviewed the studies around platform antitrust at three levels. Since the late 1990s, economists have noticed the uniqueness of the platform economy. In 2003, some famous platform economics models came out and became the basis of research in this area. Firstly, we review some famous platform economic models. At the same time, with giant platforms like Google and Facebook emerging, platform monopoly has also become a hot issue; many researchers put their effort to study what the huge platforms have done to prevent competition and whether the governments and the courts should take action against platform monopoly. More specifically, we also reviewed the articles around the antitrust case of Google and Alibaba. After the European Commission fined Google 4.34 billion Euros, there is a huge debate around the case. The Chinese government fined Alibaba 18.2 billion RMB in 2021/4, since the case is relatively new, we only find a limited number of works around Alibaba, but it's obvious that the papers around Alibaba have an idea in common, that the case of Alibaba is only a beginning; the Chinese government is going to take serious actions in platform antitrust enforcement.

2.1. Platform Economic Theories

First of all, the basic models of platform economy theory revealed the fundamental economic rules in platform economy, platform antitrust research must be based on them.

In 2003, Rochet and Tirole revealed that network externalities and cross-subsidize are the most distinguishing features of platform economy. If one side of the platform (customers) gives more network externalities to the other side (merchants), the platform tends to charge this side (customers) fewer fees, even free or subsidized, while charging more to the other side (merchants) (Rochet and Tirole, 2003). The cases with a monopolist and a Ramsey planner are also analysed. It's obvious that, although platform economy has many differences with normal economic forms, monopoly can still twist the price level away from social optimal, and a Ramsey pricing strategy can bring more social welfare. In the following studies, Rochet and Tirole give platform economy a more scientific definition, and put more effort into the price structure of the platforms (Rochet and Tirole, 2004; 2006).

Also in 2003, (Caillaud and Jullien, 2003) brought up the famous Chicken&Egg problem. For a two-sided platform, it will become attractive for one side with more users on the other side, and vice versa. Then how should a platform begin with limited users on both sides? This is the famous Chicken&Egg problem. In the research, the author shows that subsidizing on one side is necessary for a start-up platform. While in traditional economic forms and especially international trade, subsidize and prices lower than cost is known as dumping, a typical monopolistic behavior.

In 2005, Jullien also brought up a model that focuses on electronic Intermediaries. Not surprisingly, some form of cross-subsidy is

involved in pricing. At the same time, Jullien points out that since these markets are concentrated due to network effects, they should fall under the regulation of antitrust authorities, and the antitrust policy for these intermediaries have not been properly addressed so far (Jullien, 2005).

Another famous platform economy model is by Armstrong, 2006. Three cases in his model, the monopoly, two platforms competition, and competitive bottlenecks, were analyzed. Although it has many different settings, the model gets similar results that a platform will charge different fees with different network externalities. Again, in the monopoly case, the platform will charge higher prices and reduce social welfare.

2.2. Platform Antitrust Studies

The emergence of platform giants like Google, Facebook and Amazon caught the researchers' attention on platform antitrust issues. In earlier studies, Evans points out that the business platforms create enormous social welfare by internalizing externalities among the two sides. Antitrust and regulatory policies may result in significant cost, but that doesn't mean platforms are unwarranted from antitrust and regulatory scrutiny, the regulators need to be more cautious about the overall effects of regulatory and antitrust intervention (Evans, 2003). In (Haucap and Heimeshoff, 2014), the author points out that competition between platforms should be characterized by network effects, switching costs and reputation effects. Even in a monopoly market structure, platforms may face intense competition from the entrants if the switching cost is low. In another work by Evans, he analyzes some anti-competitive practices like exclusive dealing, tying and bundling in a two-sided market and gets the idea that correct economic analyses of multi-sided platforms are more complicated than correct analyses of single-sided firms, empirical work is relatively limited. At the current stage, it's not possible to come up with many detailed guidelines on platform antitrust (Evans and Schmalensee, 2013).

In a research around the Digital Subscriber Line market, which is a typical two-sided market, the result shows that intense competition doesn't improve social welfare (Distaso et al., 2006), in another empirical research around the daily deal market, the authors get similar results (Zhang and Chung, 2020). Competition doesn't improve social welfare doesn't mean monopoly platforms shouldn't fall under antitrust investigations, on the contrary, it means regulation becomes the only option. For technology platforms, (Galimulina et al., 2016) point out that the government should offer more support to technology platforms and promote technological development of society.

2.3. Studies Around the Cases of Google and Alibaba

During the European Commission's investigation against Google, and after the announcement of the penalty, there was a great debate about the rationality of the antitrust penalty.

Many researchers from the US hold the idea that tech giants like Google have brought great benefits to consumers, and shouldn't be punished for their behavior. For example, during the first investigation around Google's search practices, (Bork and Sidak,

2012) points out that according to the Chicago School's thoughts, the antitrust law should be protecting the consumers, not the competitors, the penalty of Google will violate this principle. (Clark, 2016) points out that Google brings huge benefits to its users, and most of its services are free. The court shouldn't punish Google unless it thinks that anticompetitive effects outweigh the pro-competitive effects, and should not feel restrained by the current antitrust jurisprudence. After the 4.34 billion fines, (Hylton, 2019) uses the Google case as an example to analyze three antitrust behavior, the kill zone expropriation, acquisition of nascent rivals and denial of access to data. The author holds the opinion that these behaviors will benefit the customers in some cases, the size of Google comes from economies of scale, not from anticompetitive practices. (Witt, 2019) points out that Google brings great convenience to users all over the world, including the EU. The European Commission's punishment is characterized as systematic discrimination against American corporations, and if the tech giants de-prioritize the European market, users in Europe will bear great losses. In an invited paper for the U.S. House of Representatives Judiciary Committee, (Hazlett, 2020) says that the information revolution has radically changed our society. While the purpose of antitrust enforcement is to promote Consumer Welfare, the competition policy is being re-examined, categorically reaching up antitrust enforcement is very risky that they might reduce efficiency and consumer welfare.

In (Buttà, 2018), the author comes from the Italian Competition Authority, reviewed Google's search engine case and explained in detail the reason why the European Commission punished Google. In another research about the Google search engine case (Iacobucci and Ducci, 2019), the practice of Google is described as a form of tying, which is capable of satisfying all the legal requirements for tying in the EU competition law and deserves antitrust scrutiny. About the Android, (Edelman and Geradin, 2016) points out that Google's practices do have the effect of impeding entrants, and obviously it's not reasonable to expect entrants or declining firms like Nokia to give Google effective competition.

It's obvious that the U.S. and Europe hold different opinions about the Google case, and the platform antitrust issue. (Fox, 2019) first noticed the U.S.–Europe divide, by analyzing the origins of the U.S. Sherman Act and the EU competition law, the author explains the difference between the antitrust policies in these two areas. While the first priority of American courts is to improve customer welfare, the EU courts tend to make sure that the leading firms in the market are not impairing the rivals' competition. Both sides are reasonable, but in the end the author admits that the U.S. Tech giants do pose antitrust problems, and it's time for the U.S. government to do more in antitrust enforcement.

Regarding Alibaba's antitrust case, in (Lai, 2021a), the author holds the opinion that Alibaba's case is only a slap on the wrist for the technology company, the other tech giants in China need to ensure that they are complying with antitrust laws, otherwise the Chinese government could use more penalties. In another work, Lai also points out the Chinese government is clearly tightening the regulation on big platform companies (Lai, 2021b). (Yu, 2021) claims the Chinese legal mechanism for Either-or Choice behavior

still needs to be improved. Another view is that Alibaba's case is a turning point. In the past, the Chinese government was on the same side with platforms when they were promoting economic growth and technological innovation, but now the platforms possess too much resources and power, the government needs to reassert control (McKnight et al., 2021). Obviously, most of the researchers agree that the Chinese government is going to do more in platform antitrust.

3. EMPIRICAL ANALYSIS

There have been several antitrust cases, like the European Commission fined Google €2.42 billion on 27 June 2017, €4.34 billion on 18 July 2018 and €1.49 on 20 March 2019. On 17 July 2019, the European Commission opened an investigation into possible anti-competitive conduct of Amazon. On 4 June 2021, the European Commission started an investigation towards Facebook. The Federal Trade Committee in the US also sued Facebook in 2020, but was rejected by the court. On the other side, the Chinese government strengthened platform since 2020, fined Alibaba 18.7 billion RMB on 12 April 2021, and fined Meituan 3.4 billion RMB on 8 October 2021.

We decided to use the case of Google's case regarding Android mobile devices, and the case of Alibaba for comparison. Firstly, they are the biggest and the most influential antitrust cases by the European Commission and the Chinese Administration for Market Regulation. Secondly, other cases either last too long (Google's case regarding the search engine can be dated back to 2010), or too new (the Meituan's case was not finished until October 2021). So in the main part, we are going to analyze and compare the case of Google's €4.34 billion case, and the Alibaba case. But we also include empirical analysis for other cases like Amazon and Facebook (Meituan is excluded since it's not listed in the US stock market), and present their CAR after the antitrust investigations.

First of all, we present the stock performance of Google and Alibaba in Table 1 and Figure 1. For Google, there are two stocks, Goog and Googl, the shareholders of Googl have the right to vote in the company, while the holders of Goog can't vote. We decided to use Googl in our research. Since the antitrust investigation toward Google started earlier, we collected the daily adjusted close data of Googl from the start of 2012 to present (2021/11), roughly 10 years. For Baba, the stock of Alibaba, we collected the daily adjusted close price from 2014/9, when Baba was listed on the New York Stock Exchange.

Actually, the different performances of Google and Baba after the antitrust investigation and the fines announcement are quite obvious. After the market got the news that the Chinese Administration for Market Regulation started the antitrust investigation toward Alibaba, the stock price experienced a 13.34% crash overnight. But after the European Commission started the antitrust investigation toward Google, the market didn't have any obvious reaction. During the 6 months (126 trading days) after the investigation, the stock price of Baba fell to \$228.5, which means a 10.80% loss. While the stock price of Googl came to \$676.43, a 25.32% growth. In the long run, Googl reached \$2922.34 in November 2021, which means a remarkable 441.41% growth after the antitrust investigation started. In contrast, Alibaba lost almost half of its market value in a year.

After the European Commission's 4.34 billion fines toward Google announced, again the market didn't have any obvious reaction. But after the Chinese Administration for Market Regulation announced the 18.2 billion fines for Alibaba, interestingly, the price of Baba experienced a 9.27% growth in 1 day. After 6 months, the price of Googl fell 10.19%, while Baba fell 30.14%.

From Figure 1, it's intuitively that the antitrust investigation and the huge fines didn't cause much trouble to Google. On the contrary, the performance of Google was very satisfactory during and after the antitrust investigation. But for Alibaba, it lost half of its market value after the antitrust investigation started.

Since the events happened at different times, it's possible that the market environment caused the difference. In order to eliminate the impact of the market environment, we first adopt a CAPM model, by using the residuals we are able to get the abnormal return (AR) of the stock, which has gotten rid of the market index's impact. In the next step, the cumulative abnormal return (CAR) is used to compare the performance of these stocks in different time periods.

First of all, we calculate the log return of the stocks and the market index to make sure that the time series are stationary. The statistics of the data can be found in Table 2. We also conduct a Dickey–Fuller test to verify the stationarity of the time series. The result is shown in Table 3, all the log-returns are proved to be generated by a stationary process.

In the next step, we estimate the abnormal return by regressing the stocks' daily return with the market index. Within each day, the risk free rate is very small, so we decided not to include them in our analysis. In Table 4, obviously all the stocks have a significant relationship with the market index. Besides, all the stocks except

Table 1: Price movements around investigation and the sentence

Around the antitrust investigation start							
GOOGL	2015/4/14	2015/4/15	1d return	2015/10/12	6m return	2021/11/24	return to present
	539.7800	541.0400	0.23%	676.4300	25.32%	2922.3999	441.42%
BABA	2020/12/23	2020/12/24	1d return	2021/6/25	6m return	2021/11/24	return to present
	256.1800	222.0000	-13.34%	228.5000	-10.80%	136.5200	-46.71%
Around the penalty announcement							
GOOGL	2018/7/17	2018/7/18	1d return	2019/1/16	6m return	2021/11/24	return to present
	1213.0800	1212.9100	-0.01%	1089.5100	-10.19%	2922.3999	140.91%
BABA	2021/4/9	2021/4/12	1d return	2021/10/7	6m return	2021/11/24	return to present
	223.3100	244.0100	9.27%	156.0000	-30.14%	136.5200	-38.87%

Baba, exist a β higher than 1, and have a positive α , but only the α of Amzn is significant. For Baba, it has a smaller β , which means it has a smaller co-movement with the market index, and also a negative α , which means its performance is even worse than the market index. Given that the market index has grown from 1277 in 2012 to 4701 at present, the regression result shows that the performance of Alibaba's stock is much worse than the other three. As a result, when we calculate the AR of Baba, the model is expecting a smaller daily return, the AR will be relatively higher, but still the CAR of Baba is still much worse than the others after the antitrust announcements.

$$rP_t = \alpha + \beta \cdot rSP_t + \varepsilon_t, rP_t = [rGoogl, rBaba, rFb, rAmzn] \quad (1)$$

Then we calculate the AR and CAR of the stocks using formular 2 and 3, and

$$AR_t = \varepsilon_t = rP_t - \alpha - \beta \cdot rSP_t \quad (2)$$

Table 2: Summary statistics

	Obs	Mean	Std. Dev	Min	Max
<i>rSP</i>	2491	0.0005232	0.0103226	-0.1276522	0.0896832
<i>rGoogl</i>	2491	0.0008719	0.0158296	-0.1236846	0.1506453
<i>rBaba</i>	1809	0.0002069	0.0218068	-0.1432029	0.1247979
<i>rFb</i>	2396	0.0009134	0.0229592	-0.2102387	0.2593711
<i>rAmzn</i>	2491	0.0012026	0.0189637	-0.1165029	0.1462254

Table 3: Dickey-Fuller test

	T statistic	P-value
<i>rSP</i>	-59.147	0.000
<i>rGoogl</i>	-53.094	0.000
<i>rBaba</i>	-41.591	0.000
<i>rFb</i>	-50.595	0.000
<i>rAmzn</i>	-50.721	0.000

Table 4: Regression results

Variables	<i>rGoogl</i>	<i>rBaba</i>	<i>rFb</i>	<i>rAmzn</i>
<i>rSP</i>	1.063*** (0.0222)	0.883*** (0.0405)	1.075*** (0.0393)	1.009*** (0.0308)
Constant	0.000316 (0.000229)	-0.000208 (0.000457)	0.000335 (0.000410)	0.000675** (0.000318)
Observations	2,491	1,809	2,396	2,491
R-squared	0.480	0.208	0.239	0.301

Standard errors in parentheses ***P<0.01, **P<0.05, *P<0.1

$$CAR_{[t_1,t_2]} = \sum_{t=t_1}^{t_2} AR_t \quad (3)$$

The comparison of Google and Alibaba's CAR performance is displayed in Figure 2. After the investigation started, a crash soon came for Alibaba, but the abnormal return of Google didn't show any obvious reaction. In a longer period of time (6 months), investors in Google even achieved a higher profit than usual, while the investors in Alibaba got bigger losses. After the penalty was announced, actually Baba got a significant overnight positive return, because the market has imagined penalties much worse than the 18.2 billion fines. But after that, the return of Baba fell significantly, and lost almost half of its market value. Google shareholders also had a difficult time after the penalty announcement, but the performance is still much better than Baba. In the long run, the contrast is more obvious. The price of Googl achieved quadrupled growth in the following years.

We used a t-test to verify the findings, and presented the results in Table 5. Not surprisingly, the CAR of Googl is significantly higher than Baba during the 6 months after the investigation started. After the investigation finished, the performance of Baba was actually better than Googl, as we talked before the market imagined more serious penalties. But in the long run, about 4 months after the price of Googl started to recover, its CAR during the entire 6 months is significantly higher than the CAR of Baba.

In addition, we present the CAR performance of Googl, Amzn and Fb after other antitrust cases in Figure 3, and the stock price of Amzn and Fb in Figure 4. After the European Commission fined Google €2.42 billion on 27 June 2017 (The investigation started in 2010), Googl showed a negative abnormal return, but the loss is minimum and the stock price soon rose back. After another investigation on abusive online advertising started in 2016, there

Figure 1: The price of Googl and Baba

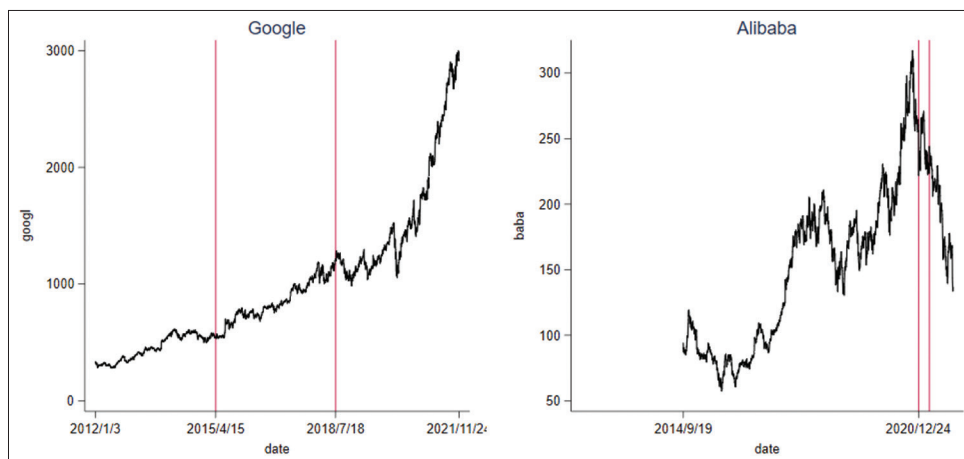


Figure 2: Comparison of Google and Alibaba

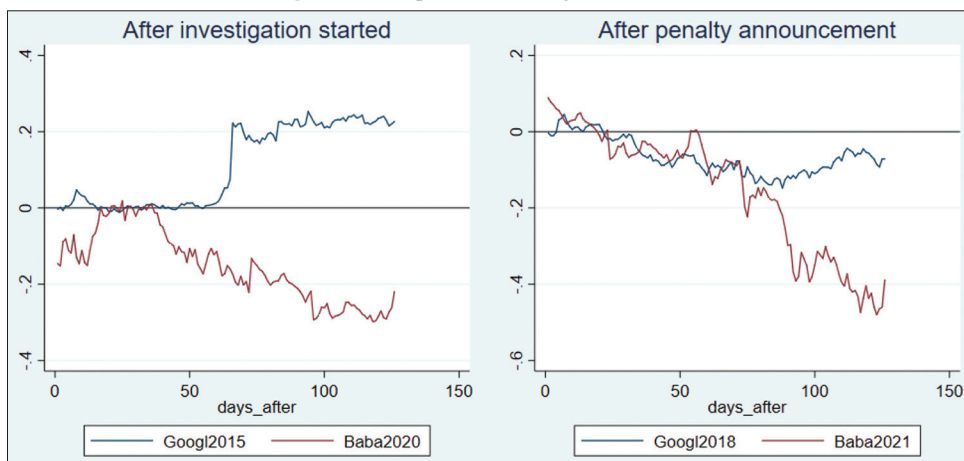
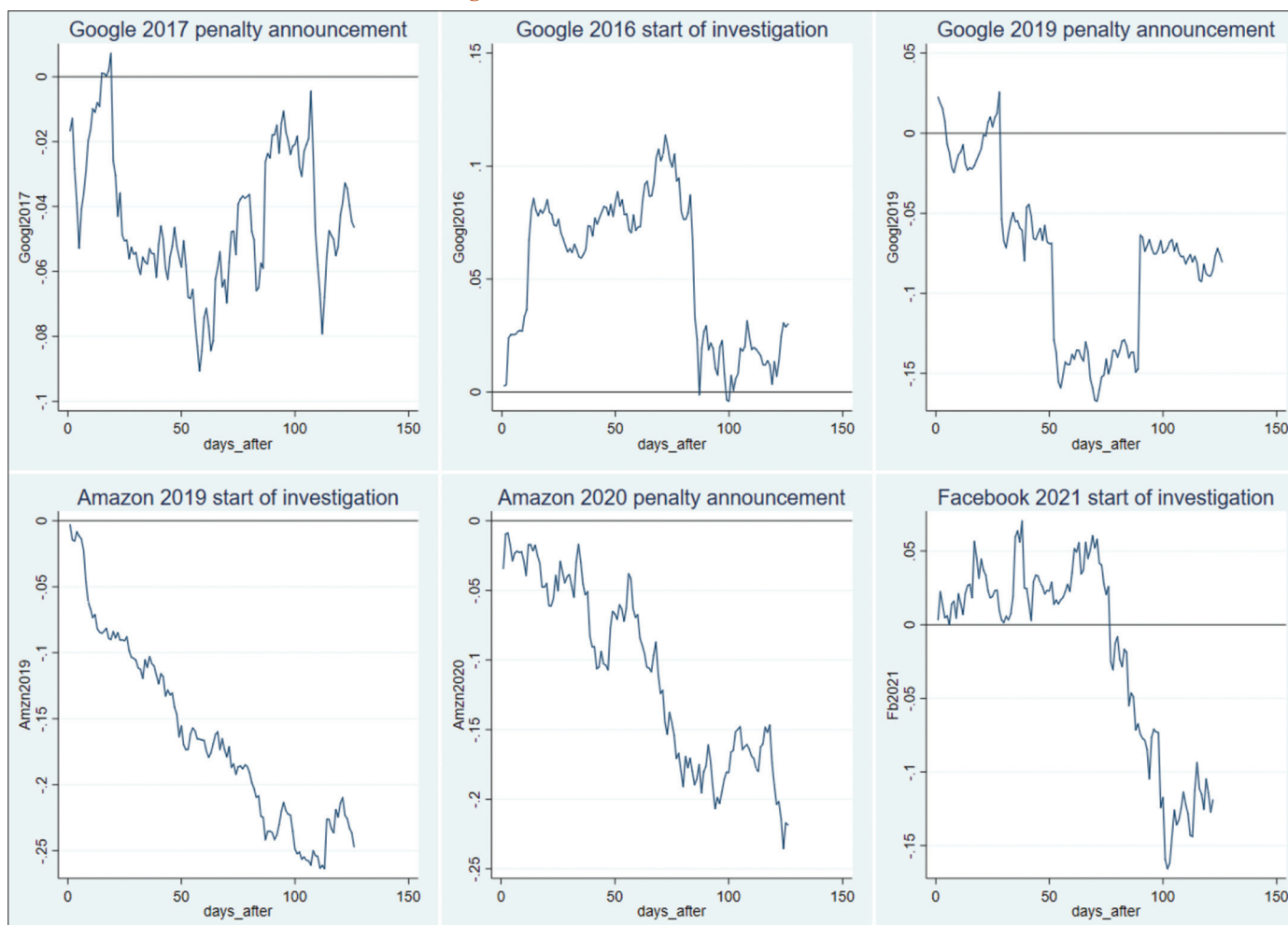


Figure 3: The CAR after other antitrust cases



was a positive CAR in Google. After the penalty was announced in 2019, a significant downturn came about 1 month later. On 4 June 2021, another investigation started toward Facebook. The performance of Fb didn't have any reaction, and the stock price reached its highest point in history 3 months later. After the antitrust investigation of Amazon started in 2019, and after the statement of objections in 2020 (not finished yet), the shareholders of Amzn got sizable losses. But from Figure 4, we noticed that

the stock price had already come back, and obviously there was a significant growth during the investigation.

4. DISCUSSION

4.1. Reasons Behind the Different Stock Performance

The fundamental factor determining the stock price is the profitability of the company, while the direct factor determining

Figure 4: Prices of Facebook and Amazon

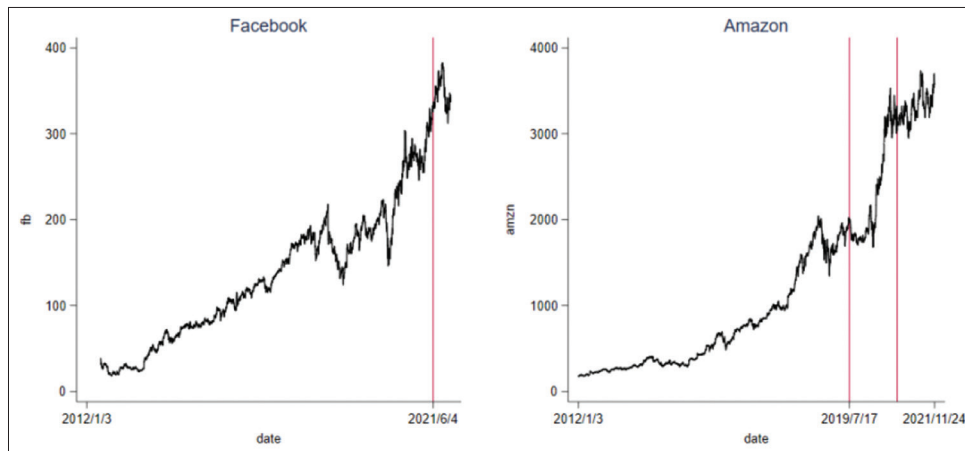


Table 5: Results of the t-test

Days after	Ha: Goog>Baba		Ha: Goog>Baba	
	t	Pr (T>t)	t	Pr (T>t)
0-21	6.8578	0.0000***	-2.6424	0.9922
0-42	5.7192	0.0000***	-1.1755	0.8767
0-63	9.7735	0.0000***	-2.6131	0.9944
0-84	10.1861	0.0000***	-0.6185	0.7310
0-105	12.5069	0.0000***	4.0627	0.0000***
0-126	15.2568	0.0000***	6.8607	0.0000***

Standard errors in parentheses ***P<0.01, **P<0.05, *P<0.1

is the investors' expectation of the profitability of the company. The investors' different attitudes and expectations toward the two antitrust cases is most likely the direct reason behind the different stock performances. The investors don't believe the antitrust enforcement of the European Commission will cause serious trouble to Google's operation and profit, otherwise the stock price will not increase over 4 folds after that. And they are correct, the profit of Google keeps growing during these years, from \$15.8 billion in 2015 to \$40.3 billion in 2020, achieved a 155% growth. By contrast, investors do believe the Chinese government is going to take serious actions in platform antitrust, and the enforcement will have significant influence on Alibaba's operation and profit. That's why the stock price of Alibaba crashed over 13.3% overnight after the antitrust case started. Actually, the 18.2 billion RMB fine is not that bad compared with the market expectation, rumors that Alibaba might be split apart were very popular, and this explained why the stock price of Alibaba increased over 9% after the penalty was announced.

We need to admit that other explanations are also reasonable. Firstly, although the investigation of the Android case, which resulted in the 4.34 billion euro fine, started in 2015, the antitrust investigation of Google has been started as early as 2010. In the beginning, the investigation of Google was around its search engine, which puts Google's own services ahead of the other search results. So it's not a surprise that the market didn't give much reaction after the EU started a new investigation, when the old investigation didn't finish in over 5 years. But this also reflects the difficulty and inefficiency of the European Commission's antitrust enforcement around the Tech giants' misconduct. While a case in the EU needs to bear huge pressure and takes many

years to get a result, the Chinese government is able to settle the issue in 4 months.

Another fact is that all the Chinese firms listed in the U.S. stock market are having a hard time. In recent years, tension has been building up between the two countries; some investors hold the idea that Chinese firms might be forced to delisted from the U.S. stock market. But if look at the first Chinese Tech company delisted this year, it's obvious that this is also related to the Chinese government's platform antitrust enforcement. On 3 December 2021, Didi announced that they would voluntarily exit the New York Stock Exchange. A few months ago, in July 2021, Didi just got a serious punishment from the Chinese government. Its app was even removed from the app store and was temporarily prohibited from accepting registration from new users. After a short investigation, the result shows that Didi improperly collected user data and conducted some serious illegal acts. At the same time, Boss Zhipin (BZ) and Yun Manman (YMM) got similar investigations and punishments, all of them are listed in the U.S. stock market. The quit of Didi, is more likely to be caused by the Chinese government's data protection concerns, not under the pressure from the New York Stock Exchange due to the tension between these two countries. In other words, the fall of Chinese stocks in the U.S. stock market, is also closely connected with the platform antitrust enforcement in China.

4.2. Obstacles in Regulating International Platforms

Since 2010, the European Commission started investigations into Google's monopoly conduct. Its effort in platform antitrust never stopped. Like we discussed above, it fined Google €2.42 billion on 27 June 2017, €4.34 billion on 18 July 2018, and €1.49 billion on 20 March 2019. At the same time, there are also investigations towards other platform giants like Amazon and Facebook. But obviously, the stock prices and the profits of the platforms reflect that antitrust enforcement didn't give much pressure to them.

The enforcement of antitrust is very difficult for the European Commission; it bears pressure from many sides, the platform companies, the scholars holding the opposite opinions, the US and some native customers. For example, every time the European Commission fined Google, Google chose to appeal. Its appeal upon the €2.42 billion fine just got rejected in November 2021;

other penalties are also in legal process. There are also different opinions on this issue within Europe, after all the platforms have brought huge convenience to European customers. In academia, many researchers hold the opinion that the investigations are improper, and stand against the European Commission.

The reasons are obvious. The platform giants like Google, Facebook and Amazon are international companies; they have dominated most places in the world, but the European Commission is only a regional authority, the powers of the platform giants and the European Commission are not balanced. That's why the European Commission is threatened that if the platforms leave Europe, the native customers will bear great losses. And those platform giants are US companies, the regulation and penalty from the European Commission or other authorities can easily lead to political disputes.

In 2020 the Australia government formulated a new regulation to force digital platforms like Google and Facebook to pay for the use of news content provided by Australian news media. In February 2021 Facebook fought back, the Australian medias are blocked, users are prohibited from forwarding their news, the operation of some departments in Australia are seriously affected. A few days later Facebook reached a brief settlement with Australia, the Australian medias on Facebook are restored, but the Australia government also agreed to make some change to the new regulation. This incident reflected the market and political power of those international platform giants.

Obviously, regulating the international platform giants is becoming a challenging task, not only for the European Commission, but also for every regional authorities in the world.

4.3. The Platform Antitrust Reform in China

In contrast, the Chinese government faces significantly fewer obstacles in platform antitrust enforcement. Although some divergences exist, most scholars in China agree that the platform antitrust needs to be strengthened. The investigation toward Alibaba took only a few months, and Alibaba accepted the penalty immediately after the announcement, "we sincerely accept this punishment and resolutely obey it," "we will strengthen the legalization of our operation," and "better fulfill our social responsibilities," as Alibaba stated. Chinese companies like Alibaba or Meituan, their platforms get most of the profit in China, and most of their employees are Chinese, no wonder that the Chinese government has stronger political power to regulate the platforms.

An influential reform in platform antitrust enforcement is taking place in China. Since 2016, the NPC (National People's Congress) Standing Committee in China started revision in the antitrust law. There have been many attempts. In a draft in 2021, the basis for determining the market dominant position of Internet platforms was added. platform enterprises with dominant positions are strictly prohibited from using data, algorithms, technologies and platform rules to impose unreasonable restrictions on other traders.

Not only trying to update the antitrust law, the Chinese government is also going to set up a series of new rules to regulate the platforms

and let them take more societal responsibilities. In August 2021, the draft called 'The prohibition of unfair competition acts on the Internet' was published for public comments, the draft clarifies that the platforms are responsible for providing guidance and norms for the competitive behavior of the operators in the platform. In October 2021, another draft called "Internet platform classification guide" and "Internet platform implementation responsibility Guide" was published for public comments. If the drafts are approved, the behavior of the platforms will be regulated more strictly. At the same time, the regulation of platforms will become easier since the courts no longer need to prove the market power of the platform as long as the platform has enough users. In a document called "Opinions on strengthening the protection of the rights and interests of employees in new forms of transportation," 8 government departments in China require the platforms to set the upper limit of commission rate reasonably and announce in public. A Chinese People's Political Consultative Conference (CPPCC) member also proposed that the government needs to limit the commission rate of platforms to reduce the pressure on small and medium-sized businesses.

The drafts are still in discussion, but with no doubt, the Chinese government has the power to fulfill them and regulate the platforms in China accordingly if they are proved beneficial to society. But for the other authorities like the European Commission, it will be much harder for them to put forward new rules to regulate the international platform giants.

4.4. Reasons that Platforms should be Regulated

4.4.1. Platforms' monopoly pricing will reduce social welfare

In the classic platform models by Rochet and Tirole, 2003 and Armstrong, 2006, it's not hard to notice that in the monopoly case, price that the platform chooses to maximize its profit, is different from the price that maximize the social welfare. In other words, monopoly pricing will reduce social welfare and the platforms should fall under the regulation of the antitrust authorities.

To illustrate the phenomenon, we construct a simple two-sided platform model that is very similar to the model by Armstrong. Assume there is a platform, which connects the users and the merchants, the number of users on the platform is n_1 and the number of merchants is n_2 , both n_1 and n_2 are normalized to $[0,1]$. In reality, most of the platforms are free for the users to access, so we assume that the platform offers an unconditioned utility $U(U>1)$ for all the users, while charging no fees, so everyone will choose to join the platform. On the other side, the platform needs to earn its profit from the merchants, so it will charge a price p . At the same time, when the platform serves a merchant, it will have a cost of f .

The most important feature of the platform economy is network externality. We assume the number of merchants will give users an externality of $a_1 n_2$, a_1 can be positive, like in Amazon, more merchants will give users more options to choose, but can also be negative, like in Google more merchants will give users more ads to watch. On the other side, the number of users will give merchants a externality of $a_2 n_1$, a_2 is always positive, since in most cases the merchants hope to get more customers. So the utilities can be calculated by formula 4.

$$u_1=U+a_1 n_2, u_2=a_2 n_1-p \tag{4}$$

Since there is only one platform and it's totally free, all the users will join the platform. But for the merchants, the number of them that decide to join the platform is determined by their utility, assume there is a demand function \varnothing that describes this relationship.

$$n_1=1, n_2=\varnothing(u_2) \tag{5}$$

Then the profit of the platform r can be calculated by formula 6, and the social welfare is calculated in formula 7.

$$r=(p-f) \varnothing(u_2) \tag{6}$$

$$w=U+a_1 \varnothing(u_2)+\int \varnothing(u_2) du_2+(p-f) \varnothing(u_2) \tag{7}$$

We can easily get the price to maximize social welfare in formula 8, and the price to maximize the platform profit in formula 9.

$$p=f-a_1 \tag{8}$$

$$p = f + \frac{\varnothing}{\varnothing'} \tag{9}$$

To maximize social welfare, the price needs to be rebalanced by the externality of the merchants. When a_1 is positive, like for Amazon or Ebay, more merchants will give customers a better shopping experience, so the price should be lower to allow more merchants to join. When a_1 is negative, like in Google, more ads will reduce users' welfare, the price should be relatively higher. Unfortunately, this is not something that a monopoly platform needs to consider. For a monopoly platform, it only needs to maximize its profit according to the shape of the demand function \varnothing , and the price will be the cost f plus a premium $\frac{\varnothing}{\varnothing'}$.

Consider the following two cases: In case 1, the platform offers a small unconditioned utility 0.1 to its users, but the users will benefit from the number of merchants and get 0.1 n_2 externality, like Amazon. In the other case, the platform offers a big unconditioned utility to the users, but as the number of merchants or advertisers increases, the users will get annoyed, like Google. At the same time, we assume a demand function \varnothing in the simplest form, $\varnothing(u_2)=u_2$.

$$\text{Case 1: } f=0.1; U=0.1; a_1=0.1; a_2=0.8; \tag{10}$$

$$\text{Case 2: } f=0.1; U=0.6; a_1=-0.6; a_2=0.8; \tag{11}$$

The platform profit r , the welfare of the users and the merchants w_1, w_2 is shown in Figure 5. In the first case, since the number of merchants will benefit the users, the platform should offer a price lower than its cost to maximize social welfare (the green line), which is $f-a_1=0$. But at this price, the profit of the platform (the blue line) is negative. Not surprisingly, a monopoly platform will not do that, it will maximize its own profit while offering a price of 0.45. In the second case, since the users don't like ads, the platform should offer a higher price to reduce the number of advertisers, which is $f-a_1=0.7$. But actually the profit function for

the monopoly platform doesn't change, the price of the monopoly platform is still 0.45.

This simple platform model reveals the basic idea, that in platform economy a monopoly platform is able to achieve monopoly pricing and reduce social welfare just like a monopoly producer in a one-sided market.

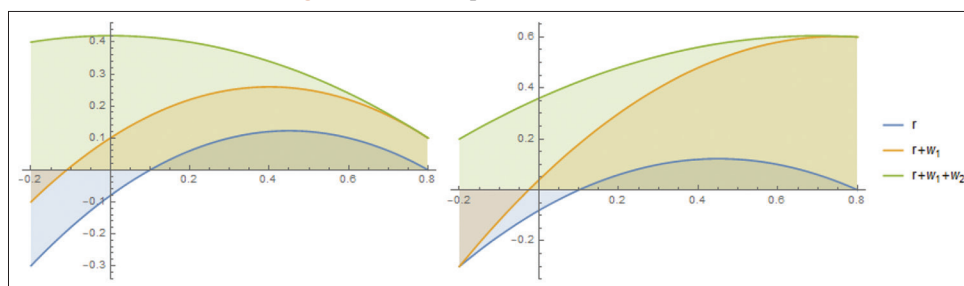
The problem brings by the uniqueness of platform economy is that market competition may bring greater loss to social welfare. In a one-sided market, as long as there are plenty of producers, competition will make the price lower and achieve social optimal, but in platform economy it's more complicated. In many cases, a larger number of users will give a bigger externality to the other side. If there are two or more platforms in the market, the users and merchants will split into different platforms, both sides will lose sizable externality. That's why many researchers hold the opinion that the size and the monopoly of the platform giants will benefit customers and social welfare. It's true, a monopoly platform can indeed bring higher benefits than several decentralized platforms, but it's also true that control over the monopoly platform can bring even higher benefits to society, it's not contradictory. Platforms like Google and Amazon have brought great convenience to consumers, but as long as the monopoly pricing of a platform is different from social optimal pricing, it's meaningful to put the monopoly platform under regulation. A monopoly market structure is acceptable, but more regulations are needed to make sure that the monopoly platform's operation is benefiting social welfare. That's the basic idea that many classic theoretical platform economy research sharing (Caillaud and Jullien, 2003; Rochet and Tirole, 2003).

4.4.2. Dual character of platforms

There is a popular idea in China that platforms present a dual character of both corporation and market. For corporations, it's reasonable to let them compete with each other. Corporations will try their best to give better service, offer lower prices, and maximize social welfare automatically with competition, that's the starting point of antitrust thoughts and competition law. But for the market, it's naturally a good thing that one big market brings all the sellers and buyers together, and obviously the market ought to be regulated more strictly, not only for its monopoly and market power, but also for its nature as a market.

Is platform a new thing? From the markets in ancient Rome, to the bazaars in the Middle East, a place is offered for all the buyers and sellers to come together and trade, is there any difference between this economic form and Amazon? The only difference is the information technology. With new technology, the Tech giants are able to bring all the sellers and buyers together on the Internet, the scope of the market becomes much wider and the communication between buyers and sellers becomes more convenient, but its nature as a market has not changed.

For markets, regulation and government interventions are often needed. In 1455, the construction of the Grand Bazaar in Istanbul started under Sultan Mehmed II's command. Thanks to the vast territory of the Ottoman Empire and its location on the Silk Road, the Grand Bazaar became one of the most important trade centers

Figure 5: Platform profit and social welfare

in the world. Buyers and sellers from Asia and Europe come together to trade here, it's also a platform just like Amazon. Under direct order of the authority, sellers in each category are required to gather together to encourage competition, the streets of textiles, jewels and spice then emerged. Centuries ago, the authority already figured out that competition should be encouraged within sellers, while the market needs to be regulated properly to accommodate as many sellers and buyers as possible. If a government recognized the nature of platform as a market, it will realize that it is far from enough to restrict the platform only with the anti-monopoly law and competition law designed for enterprises.

4.4.3. Platform service is quasi-public good

Public good is a classic economic concept. A good or service that is both non-excludable and non-rivalrous is called a public good (Oakland, 1987). Non-excludable means that the users cannot be stopped from using them, while non-rivalrous means that a user using it will not prevent other people from using it, or reduce other people's utility of using it. For platform service, the platform company can limit the users' access to the service if he refuses to pay, so it's excludable. But the cost structure of the platform determined that, once the platform is constructed and plenty of users have been attracted to the platform, the cost to serve an additional buyer or seller is actually very low, so when a new user using the platform service will not cause any trouble to other users, in the contrary, he will give additional externalities to the user on the other side, so generally speaking, the platform service is non-rivalrous.

When excludability is possible but is non-rivalrous to some extent, it can be called quasi-public good. There are many quasi-public goods in society, like public health, museums, transportation and education, obviously government intervention and regulations are very common in these areas. So if platform service is also recognized as a quasi-public good, government interventions then become reasonable and necessary.

4.4.4. Keep the platforms' R&D in the right direction

A major reason many researchers oppose strict antitrust enforcement is R&D. With technological development, our life has become very convenient today. We can study, shop, play games or order meals on our phone, many of the technologies supporting those activities are indeed developed by Tech giants like Google. If strict antitrust enforcement is posed on them, some argue that the R&D will be influenced, and the social welfare will also be harmed.

But not all the technologies are beneficial to social welfare, some might be helpful only to the platform's profit. Currently, data

protection is a hot issue, the Tech giants have put huge effort into R&D around big data. The platforms can collect huge amounts of data to portrait their customers, with the big data they can predict what a customer tends to buy, which kind of ads the user tends to click, which user is more wealthy and is more valuable for advertisers, and so on. The platforms hold the idea that it will bring in more transactions and promote economic growth, but is this really something customers want? At least someone holds the opposite opinion. The point is, the public needs to provide a clear code of conduct for the platforms, let them know what they can do and what they cannot, then the platforms will conduct their research and development accordingly in the right direction.

5. CONCLUSION

In the empirical analysis, we proved that the stock performance of Alibaba is much worse than Google after the antitrust investigations and huge fines. The difference is not caused by the market fluctuation in different time periods, but the investors' different expectations on the antitrust enforcements of the two authorities. After several other antitrust cases in Google, Amazon and Facebook, some caused significant negative impact in the short term, but the impact didn't last for long. During the last decade, together with the antitrust investigations, the platform giants achieved long last growth in their profit and stock price.

Platform companies like Google, Amazon and Facebook have dominated most of the places in the world, while the European Commission is only a regional authority. As a result, the European Commission faces a lot of pressure during its judgement and regulation. If it goes too far, the platforms may just leave Europe, and that will cause great harm to European customers. It's indeed a doubt that whether the European Commission or any other regional authorities have enough political power to put the platforms under effective regulation. In contrast, platforms like Alibaba and Meituan are Chinese companies, they get most of their revenue in China, not surprisingly the Chinese government has full political power to put them under strict regulation.

Two factors may also play an important role in this difference. First, the investigation of the European Commission started many years ago, the market may have already adapted to such news. Second, since the end of 2020, all the Chinese stocks listed in the U.S. stock market are having a hard time. But as we explained, they are also reflections of the different political power of the two authorities in antitrust enforcement.

The U.S. authorities are more conservative on platform antitrust enforcement. As the origin place of antitrust economic thoughts and antitrust law, the United States enacted the Sherman Antitrust Act as early as 1890, and split many large enterprises like Standard Oil. But upon platform antitrust cases in recent years, the U.S. courts have become more conservative. For example, in December 2020, the attorneys general of 48 states and regions jointly took Facebook to court for its monopoly, but on June 2021 the Washington, D.C. court rejected the charges. After the 1970s, the Chicago School economic thoughts took over, the Chicago school holds the idea that in some industries, the emergence of monopoly is an inevitable result of market development, and opposes government interference. Some researchers also found that the split of big companies didn't increase social welfare, on the contrary, it makes American enterprises lose their advantages in international competition (Lenard, 2019). Since then, the U.S. courts have become more careful and conservative upon antitrust cases.

We also discussed several reasons why the platforms need to be regulated properly. First of all, the monopoly platform also has excessive market power and their monopoly pricing will reduce social welfare. Secondly, the platform is not only a company, but also a market, and the market needs additional regulation. Thirdly, platform service can be recognized as a quasi-public good, for quasi-public goods like public health, museums, education and transportation, government regulation and intervention are very common. Finally, strict regulation may impair R&D, but a clear code of conduct is necessary for the platforms to make sure their R&D is in the right direction.

But the stock performance of international platform giants like Google and Amazon reflects a hard truth, that putting those platforms under regulation will be a challenging task. In their respective business areas, they have dominated most of the countries in the world. Europe, as the biggest economic body, the most developed and wealthy region in the world, its judicial authority still faces many obstacles just trying to make the platforms compile to its current competition law. And the European Commission is only responsible for European customers, it will be even harder for the other regional authorities to regulate the platforms and strengthen antitrust enforcement. Obviously, regulating the international platform giants is becoming a challenging task; it requires the cooperation and efforts of all countries in the world.

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