The Effect of Top Technology Enterprises' Investment to Small Tech Businesses on Government funding in America

Yuzhuo Chen[1]

[1]Master, Department of economics, New York University.

Vicky0829chen@gmail.com

Abstract. Do top tech companies affect the government funding to small businesses? This study collects and reorganizes the data corresponding to wealthy elites from 2015 to 2020 in the United States of top 50 technology industries and applies panel data model to examine whether the grants from top technology companies to small tech business will affect the funding from government to small businesses. The result statistically reflects an impact of the top tech industries toward policy and finds that the growing power of technology companies has a certain degree of influence on the policy of government funds.

Keywords: government funding, small tech businesses, policy, technology enterprises, innovation.

1 Introduction

Top or high-tech companies are powerful in the political process. The establishment of large tech plants will increase local productivity and induces government policies to protect and support the development of these technology factories. There are studies tackling the correlation between the rising status of tech companies and government funding to R&D industries. Specifically, the economy is becoming more digital, leading to more prominent positions of technology firms.

The impacts of top technological enterprises cannot be underestimated. The development of technology is crucial to society. Thus, tech corporations have expanded rapidly and acquired sovereignty. They have more resources and strength to compete in the market with some confines. The elites (wealthy businesspeople) from these companies have more influence on politics than general voters. The government supporting small technology companies can extend this phenomenon,

Politic is critical for technological innovation. Political decisions can directly or indirectly affect innovation activities and alter the economic environment. Historically, the government in America utilized patent policy, and direct government funding to reward technological innovation. According to empirical evidence from economic studies, these mechanisms have promoted innovation in different fields and caused significant impacts in economic development.

H. Mallick et al. (Eds.): ICEMCI 2022, AEBMR 231, pp. 421–429, 2023.
https://doi.org/10.2991/978-94-6463-098-5_48

When the large corporations dominate the entire tech industry but restricted by policies, I become curious if these large corporations have significant influences within the government system. In this article, I will demonstrate my argument about how top technology companies and their ultra-wealthy elites can influence policy in the United States by using panel data from 2005 to 2020 including 50 technology enterprises in Forbes.

The sections of the paper are organized as: section 2 represents my theoretical argument; section 3 explains choice of data; section 4 analyzes the data through STATA, and section 5 concludes the above.

2 Theory

This section will introduce technological innovation as a new factor that can affect the interrelationship between top tech corporations and government funding to R&D industry. Further significantly discuss theoretically, the role of policy plays in technological innovation in the market and explain that powerful tech industries dislike the introduction of innovation activity. Based on the effects of innovation on both top companies and policy, the last portion will conduct an idea of possible attitudes of top companies toward interrupting institutional change on technology.

2.1 Policy and Innovation

Innovation not only maintains the competition between organizations within the market but also supports economic growth. In the 19th century, Western countries had the trend of high growth in productivity and incomes leading to discovery of the economic gap among countries and the necessary role of technological innovation in long-run economic growth. Innovation provokes greater output with the same input, leading to higher productivity and economic growth. Thus, innovation sustains and accumulates economic growth.

Though technological innovation is beneficial for both economy and enterprises, it consists of uncertainties that might lead result such as market failure. The role of policies may protect and stimulate technological innovations. According to (Dolfsma & Seo, 2013), policy which stimulates innovation and technological development is different from the policy which stimulates certain types of firms, such as Small and Medium-sized Enterprises, or certain industries [4]. The government now has developed a diverse set of policies to interact with the stimulation of technological innovation.

In conclusion, since innovation is a path of exploring new ideas to stay competitive in the market. Effective policies become an important factor to balance social and economic power. An effective policy can encourage a firm's innovation motivation, boost the economy, provide direction for social and technological issues, and prevent the unpredictable changes that are brought by innovation.

2.2 Top Companies Dominate the Market

Top tech companies such as Microsoft and Amazon, hold economic power in the market and enormous attention from politicians in past decades. The elites from those companies use variety of ways to influence the policy processes by governments to gain more social resources and wield more power. This idea magnifies the fear of losing this status. Therefore, this strong sense of fear could lead to negative outcomes. For instance, when new innovative activities in the market with potential threats to the power of top enterprises, these enterprises can invest, acquire or provide resources to gain benefits from small businesses without changing their business models and update technologies. These strategies avoid top enterprises to be replaced and expand the business map and control with new technologies.

Kim(2002) introduced technological advances do not always have positive outcome, and decisions regarding innovation adoption reveals elite's interests[6]. Thus, the decision of adopting innovation might be based on companies' needs. Top companies might provide resources for small businesses for their own benefit, such as easier to manipulate chosen small companies to limit the growth of other small companies. In other words, dominators of the market, can impose numerical barriers that prevent the growth of small businesses from the emergence of new competitors in the market. and secure prior position. Therefore, we believe that large corporations support small businesses to gain self-benefits, through elimination of proper resources accessible for small businesses and more innovation activities.

2.3 Policy vs. Top Companies

The previous section discussed top companies controlling small businesses. This section will expand on this theory and reveals conflict between policy and large tech corporations.

Conflicts can arise when large corporations hinder innovation but policy support incentives. In the US, growing concern for big business is rising within tech industry along with influence in politics. Martelli (2013) expressed concern among lawmakers who concentrate power in a few companies could jeopardize the economic ecosystem [5]. For the most part, large companies dominate the market, and small companies have to cooperate in order to survive. When large enterprises penetrate or even annex small enterprises through different forms, large enterprises tend to monopolize the market. When policies prevent large corporations from monopolizing, these large corporations often feel that policies are limiting their self-benefits.

The following part of this paper will use the panel data model to test this statement, that represents the penetration and influence of large enterprises on small enterprises affecting the government's support funds for enterprises.

3 Research Methodology

This section discusses the research methodology utilized to conduct this study. This study explores the impact of top tech firms on government funding for small tech firms in the United States.

3.1 Sample Choice

The 50 tech companies from the technology sector are displayed in Table 1. The companies were the top tech corporations selected from MarketCap.

Table 1. Author's own Drawing (Profile of Sample Companies Under Study (BSE))

No.	Name	Symbol	NO.	Name	Symbol
1	Amazon	AMZN	14	Broadcom	AVGO
2	Microsoft	MSFT	15	Adobe	ADBE
3	Oracle	ORCL	16	Salesforce	CRM
4	Alphabet	GOOGL	17	Cisco	CSCO
5	Dell computers	DELL	18	Qualcomm	QCOM
6	Apple	AAPL	19	Texas Instruments	TXN
7	Ubiquiti Networks	UI	20	AMD	AMD
8	Tesla	TSLA	21	Intel	INTC
9	Nvidia	NVDA	22	Intuit	INTU
10	Meta Platforms	META	23	IBM	IBM
11	paypal	pypl	24	Automatic Data Processing	ADP
12	Zoom	ZM	25	ServiceNow	NOW
13	Roper Technologies	ROP	26	Analog Devices	ADI
No.	Name	Symbol	No.	Name	Symbol
27	Applied Materials	AMAT	40	On semiconductor	ON
28	Twitter	TWTR	41	Micron Technology	MU
29	Costar Group	CSGP	42	Fiserv	FISV
30	Equinix	EQIX	43	Activision Blizzard	ATVI
31	Uber	UBER	44	Synopsys	SNPS

32	Electronic Arts	EA	45	Snowflake	SNOW
33	KLA	KLAC	46	Doordash	Dash
34	HP	HPQ	47	Cadence Design Systems	CDNS
35	Workday	WDAY	48	Palo Alto Networks	PANW
36	Fortinet	FTNT	49	Vmware	VMW
37	IQVIA	IQV	50	Marvell Technology Group	MRVL
38	CrowdStrike	CRWD			
39	Autodesk	ADSK			
[Footnoot]source: companiesmarketcap.com					

3.2 Data Selection and Source

Data were collected from the official website of USAspending, EDGAR, and companies' annual reports. The study is confined from 2015 to 2020.

3.3 Variables and Model

The dependent variable reflects the government spending on those top tech companies (govtfunding). The data is collected from the USAspending.

The independent variable is the investing activities from 50 top enterprises to small business (investment). The investing activities include acquisitions and investments in other companies. All public companies must provide record to the US Security and Exchange Commission (SEC). The data is collected from the SEC of the 50 companies. Some data was missing because the companies was in transition period. Therefore, had not established or posted any investing activities on annual report.

For control variables, I collected data based on asset size (asset), leverage (leverage), return on assets (roa), return on equity (roe), p/e ratio (peratio), growth rate (growth). Further, I included a dummy variable which presents the tech elite's political preferences in that company (elitepo).

Panel Regression Model will allow possibility for conducting multidimensional analysis from 2015 to 2020. To run panel regression, we will choose Fixed Effect Model, which assumed that certain variables do not vary across time.

4 Results and Analysis

μ_{01}: the more investment from large enterprises cost on small enterprises, the less the government funding to large enterprises.

4.1 Descriptive statistics

Table 2 displays descriptive statistics; I found a large gap between the government funding for large enterprises since the maximum values are 0.01 million and 8318 million respectively. Also, there is a wide disparity in the quantity of investment that large firms invest in small tech business. This is possibly due to the business model of different technology companies, and they spent a great fortune in the tech market in the early years. For example, Zoom only spend a small portion of money to invest before 2018 and it received relatively low government funding compared to other top tech corporations.

Table 2. Author's own Drawing Based on STATA (Descriptive Statistics(million))

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
govtfunding	267	385.9	995.0	0.0100	8,318
investment	267	14,364	55,972	0.85	720,777
asset	267	53,117	78,281	355	375,319
leverage	267	8.852	102.2	-37.17	1,601
peratio	267	96.29	678.5	4.04	10,234
roa100	267	7.598	10.77	-28.49	47.10
roe100	267	18.66	128.9	-562.3	1,732
growth100	267	18.12	33.18	-55.19	365.3

Note: SD represent standard deviation. This table displays variables used in this paper.

Table 3. Author's own Drawing Based on STATA (Correlation Analysis of Main Variables)

| govtfu~g invest~t asset leverage roa100 roe100 grow~100	
----------+----------	
govtfunding | 1.000	
investment | 0.187 1.000	
asset | 0.345*** 0.616*** 1.000	
leverage | -0.102** -0.016 -0.036 1.000	
roa100 | 0.166*** 0.162** 0.143** -0.141** 1.000	
roe100 | 0.049* -0.049 0.046 0.856*** -0.050 1.000	
growth100 | 0.004** -0.050* -0.099 0.015** -0.036 -0.013 1.000	
peratio | -0.034 -0.021 -0.045 -0.010 -0.070 -0.019 0.055	

| peratio	
----------+---------	
peratio | 1.000	

Note: *** p<0.01, ** p<0.05, * p<0.1. The same below.

Table 3 is the correlation analysis of the main variables. The correlation coefficients of the important variables in the model reaches a significant level. In Table 3, it reflects Government funding large enterprises have a positive correlation with the investment intensity of large tech business in small enterprises. Moreover, the VIF value is 2.12. and there is multicollinearity among the variables. In the next section, this article will present empirical regression results.

4.2 Regression Results

Table 4 (Model 1) displays the negative coefficient between government funding to large enterprises and investment to small enterprises from large enterprises, and it is significant at the level of 0.01. This result confirms the hypothesis as the larger enterprises invest in small enterprises, the less the government subsidizes large enterprises. According to the control variables, we discover that when top companies have more assets, they receive more government funding. Moreover, it reached the one percent level of significance in the statistical sense. The reason may be that these top companies need more R&D investment. Moreover, they may have various businesses to request for funding from the government.

Table 4. Author's own Drawing Based on STATA (Regression Results)

VARIABLES	Model 1 govtfunding	Model 2 govtfunding	Model 3 govtfunding
investment	-0.14***	-0.004	-0.07**
	(-2.72)	(-1.02)	(-2.07)
asset	0.006***	0.006***	0.004*
	(4.17)	(3.92)	(1.81)
leverage	0.305	-0.875	-0.211
	(0.47)	(-1.14)	(-0.79)
roa100	13.671**	10.880*	2.101
	(2.21)	(1.94)	(0.99)
roe100	-0.002	1.066	0.219
	(-0.00)	(1.53)	(0.86)
growth100	1.373	1.392	-0.211
	(0.83)	(0.86)	(-0.73)
peratio	-0.015	-0.017	
	(-1.28)	(-1.40)	
asin		-0.000*	
		(-1.88)	
Constant	-4.281	-11.053	34.315
	(-0.06)	(-0.16)	(0.58)

Observations	232	232	245
R-squared	0.160	0.172	0.136
F test	2.19e-05	7.66e-07	1.35e-05
r2_a	0.134	0.142	.
F	5.092	5.891	.

Robust t-statistics in parentheses

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

Note: This table shows the different results of testing variables. Three Model 1 shows the result of estimating the relationship between government funding to large enterprises and investment to small enterprises from large enterprises, by running a simple OLS regression. Model 2 tested the interaction between on government funding. Model3 RE model.

The Model 2 tested the interaction between the company's asset and investment moderation effect by setting the product of the company's asset and investment. I found that the impact of the interaction term on government funding is negative. The higher the asset and investment of the company, the less funding the government will issue.

I use Hausman's test to draw conclusions and increase credibility for the method used for hypothesis examination. Hausman's value (0.1808) is greater than 0.05. Thus, using random effects model to complete the third column (Model3) is appropriate. Inspecting table 4, there is a negative correlation between government funding of large firms and large firms' investment in small firms. This result also confirms the hypothesis that investment by large firms in small firms has an inverse effect on government subsidies to large firms. However, An R^2 of 0.136 indicates that the variation in the dependent variable is 13.6%. This indicates potential erratic factors that's causing explanatory variable insufficiency.

5 Conclusion and Problems

This article utilize the form of a panel data model to examine the impact of investment in small business by top firms in the United States based on government subsides. This concludes that top firms' investment on small business increase is directly proportional to the decrease of government subsides due to the size of enterprise capable of manipulating the market and resulting in less government funding.

This brief empirical analysis has some potential source of error. There are only 50 top companies in the sample, which may lead to certain deviations in the results. Further, the lack of control variables and observations can reflect insufficient comparison of results. This article functions as revelation and provides idea of panel data on the impact of large tech companies on government grants, and more data and testing are needed to support it.

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