Local Government Startup Supporting Policy:
An Economic Approach

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Abstract

This paper analyzes local government startup supporting policy through the lens of economic principles. To analyze the effectiveness of supporting policy, the paper employs inter-temporal maximization and a game theory. The analysis indicates that with uncertainty "simply receiving subsidy" is a dominant strategy over "sincerely operating a firm". The existence of uncertainty induces more pre-cautionary savings; thus a new businessman uses less resources for the firm during the supporting period. The analysis also suggests that reducing the uncertainty through a social safety net, for example low cost bankruptcy, can improve current problems of supporting programs.

Key Words: startup supporting, pre-cautionary saving, bankruptcy, inter-temporal maximization, uncertainty

Ⅰ. Introduction

After the late 1990s, Korean government faced one big problem, unemployment of young generation (figure 1). In order to solve the unemployment problem, central government has encouraged making new firms by young businessmen. Making new firms, however, has not been successful. College graduates seem to be not interested in making new firms although government encourages it with some support programs.

Figure 1. Unemployment rate 1990−2017
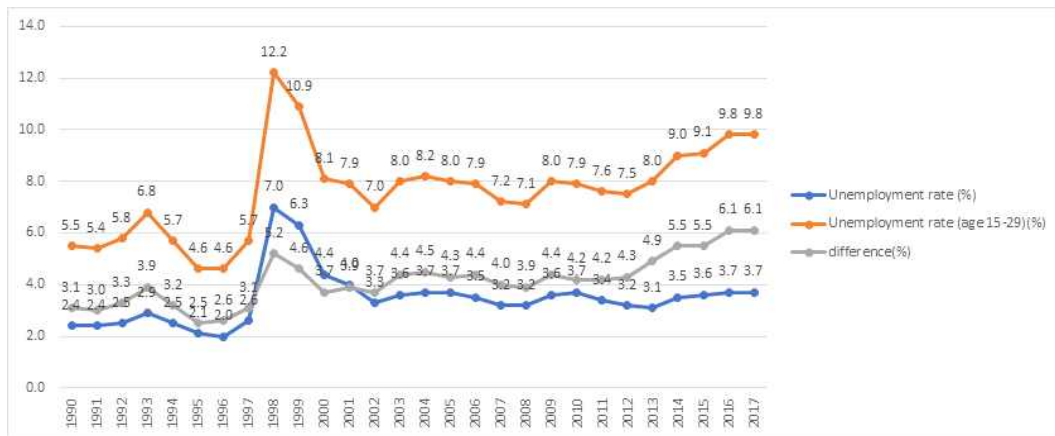
This paper analyzes the startup supporting program by local government. Local governments, following the central government policy, pursue many startup supporting programs. Local governments execute diverse policies within their capabilities. For example, in 2018 local government A sets about 4.5 million dollars as a budget for startup related programs. The programs includes supporting food trucks (0.1 million dollars), building a logistic center for young entrepreneurs (3.5 million dollars), supporting social firms (0.45 million dollars), building a local workshop (0.46 million), and building a hub for virtual reality technology (0.11 million dollars). These programs are directly or indirectly giving subsidies to the applicants. Those policies are evaluated as successful just like many other government policies. Most supporting programs, however, are unsustainable and inefficient for various reasons.

For example, most startup supporting center provides services during limited application periods. When a potential businessman contact the center after the application period, it is very likely to get an answer saying, "please apply in the next application period." Also, application condition is very limited. If a college student is registered in city A, but attends a school in city B, then the student is difficult to get a support from city B.

Current supporting policy is more focused on nominal outcomes (for example, the applicant must register a business within the supporting period. In many cases, the policy excludes former business owners), not real outcomes (arguably, successful operation is a secondary issue if the applicant registers a business). It also focuses on legally appropriate procedure of implementing the policy rather than practical and flexible supporting for entrepreneurship. Legal correctness requires particular paperworks and accountable budget spending with receipts. Thus, government officers have little incentive to providing supports to the non-selected/non-resident applicants outside the application period/division duty. This paper calls this type of behavior as

"minimum support".

In case of food trucks, several central government departments support the business by young people. Regardless of the supporting central government, starting a food truck requires getting a license from the local government, food and safety division. Pursuing central government's supporting program is related to job policy division in the local government. Under the circumstance of "minimum support", the applicant need to satisfy the conditions and paperworks of two divisions. Otherwise, it is difficult to get effective support from the local government.

In sharp contract, successful startup supporting policies – for example Fukuoka-city, Japan – provide supporting services anytime in the year regardless of application period (Yamazaki, 2018). If the supporting center have no budget for subsidy, then the center provides some legal and practical services for registering a firm (for example, giving information on how to contact different divisions). The supporting program even applies to foreigners. This paper calls this type of behavior as "maximum support." A simple game theory model shows "maximum support" is not a dominant strategy, which is not a surprise under a conservative government structure.

Moreover, it is widely recognized that applicants for the supporting program are more interested in "simply receiving subsidies" instead of "sincerely operating a firm". The game theoretical approach also indicates that "sincerely operating a company" is not a dominant strategy over "simply receiving subsidies".

With uncertainty, inter-temporal maximization shows that saving own resources for the uncertain future, which is similar to pre-cautionary saving in economics, is better than using own resources for the new firm. This means that closing the firm after the support period is very likely to be optimal for a new businessman. A very likely path of young entrepreneur is facing a failure in her first firm. Borrowing money may delay the failure, but the young entrepreneur is very likely to end up with debts when the firm fails. Personal bankruptcy is extremely difficult under the current Korean legal system, especially for the young entrepreneur with limited legal experiences. Therefore, a college graduate does not make a firm at all from the beginning, or close the firm immediately when the government funding stops.

The main goal of this paper is to analyze local startup supporting policies using economic principles. The paper also provides a policy recommendation to improve current problems related to uncertainty. Economic theory indicates that decreasing uncertainty by providing social safety nets including low cost personal bankruptcy can improve current problems.

Section 2 of the paper describes economic models. Section 3 provides a policy recommendation on facilitating entrepreneurship. Section 4 concludes the paper.

II. Economic Analysis on Government Subsidy for Startups

1. Basics

This paper implements an inter-temporal (two period) maximization model for a college graduate following Sims (2012). Suppose that the college graduate lives for two period: the present (t) and the future (t+1). The college graduate gets a stream of resources (that is similar to initial endowment) in two periods with certainty: Y_t and Y_{t+1} (This assumption will be relaxed in section II. 3. when we introduce uncertainty that is more important in this paper). The college graduate can use her resources each period, C_t and C_{t+1}. She can also save or borrow resources in the period t, $S_t = Y_t - C_t$ (borrowing is negative saving). She earns (or pays) interest r_t on saving (or borrowing), thus S_t today gives $(1+r_t)S_t$ in terms of resources tomorrow. Everything in the model is in real values, meaning Y_t, C_t, S_t, r_t are denominated in physical units of resources.

The college graduate have two budget constraints: one in the present (t), another in the future (t+1).

$$C_t + S_t = Y_t$$
$$C_{t+1} = Y_{t+1} + (1+r_t)S_t$$

The paper assumes the college graduate gets utility from using resources for her new firm. In other words, using her resources for the firm and receiving some profit or experience is similar to consumption while she is operating a firm. The overall utility is equal to a weighted sum of utility from using resources in the present and in the future periods.

$$U = u(C_t) + \beta u(C_t+1), 0 < \beta < 1$$

β is the discount factor.

The model assumes that the utility function has two properties:

$$u'(C_t) > 0$$
$$u''(C_t) < 0$$

Put differently, utility is increasing and concave in using resources, which is generally accepted in economics.

The college graduate maximizes her utility by choosing her present and future resource

spendings:

$$\max\{C_t, C_{t+1}\} \ U = u(C_t) + \beta u(C_{t+1})$$

subject to two budget constraints

$$C_t + S_t = Y_t$$
$$C_{t+1} = Y_{t+1} + (1+r_t)S_t$$

The first order condition for utility maximization is

$$u'(C_t) = \beta(1+r_t)\,u'(C_{t+1})$$

This first order condition shows that marginal utility for the present must be the same as the marginal utility for the future (after controlling the discount factor and the interest rate).

The maximization problem can be graphically analyzed by using an indifference curve-budget line diagram (figure 2). C_t^* and C_{t+1}^* denote the utility maximized point.

Figure 2. Indifference curve-budget line diagram, income effect
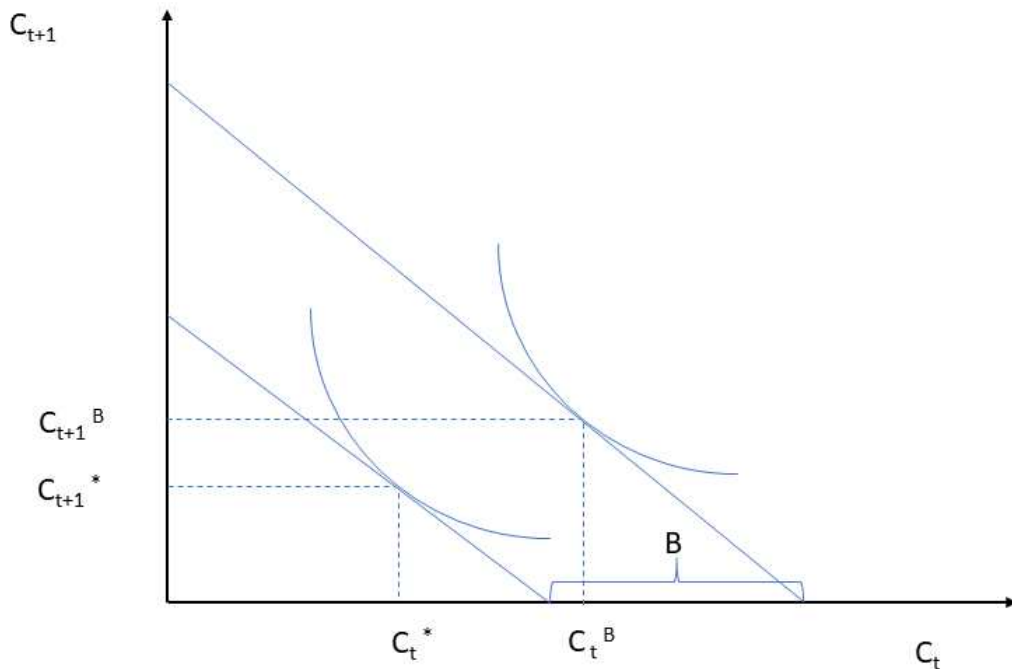
2. The impact of government subsidy

This subsection analyzes the impact of government subsidy (B) by using the indifference curve-

budget line diagram. Suppose that the college graduate receives the government subsidy at the beginning of period t. The government support program finishes at the end of period t. Attaining the subsidy implies that resource in period t becomes bigger, (Y_t+B). In the diagram, attaining subsidy moves the budget line outward. The slope of budget line is the same. The point of new maximization is somewhere to the northeast $(C_t^B$ and $C_{t+1}^B)$. The college graduate uses more resources for the firm in both periods. This is an income effect (because using resources for her firm is a normal good) in economics. In other words, the government gives the subsidy for a new firm, because the college graduate can spend more resources for her firm in both periods. More available resources will encourage to make a new firm. However, this income effect, encouraging startups, may not happen with the existence of uncertainty.

3. The impact of uncertainty

In the subsections II. 1. and II. 2, the model assumes that the amount of future resource is known in the present – that is, at time t the college graduate knows Y_{t+1} without uncertainty. In this subsection, this assumption is relaxed and the model considers the impact of uncertainty on spending resources.

Suppose that the future resource can be two values: $Y_{t+1}^h > Y_{t+1}^l$ (superscript h denotes high state and l denote low state in terms of future income). The probability of being the high state is p and the probability of being the low state is (1- p). The the expected value of Y_{t+1} is the same as:

$$E(Y_{t+1})=pY_{t+1}^h + (1-p)Y_{t+1}^l$$

Then, the maximization problem of the college graduate needs to be changed. The college graduate wants to maximize expected utility subject to inter-temporal budget restrictions. It is expected utility because, if she runs a firm, her future resource cannot be known for sure. If the firm is successful, the available resource in the future will be relatively high. However, if the firm is not successful, then the available resource will be low.

The first order condition for maximization is:

$$u'(C_t) = \beta(1+r_t)E(u'(C_{t+1}))$$

It should be noted that what comes up on the right hand side is the expected marginal utility of resource spending $E(u'(C_{t+1}))$, which is not the same as marginal utility of expected resource spending $u'(E(C_{t+1}))$. With two possible outcomes of available future resources, there are two possible resource spendings. Thus, there are two budget restrictions in the future.

$$C^h_{t+1} = Y^h_{t+1} + (1+r_t) S_t$$
$$C^l_{t+1} = Y^l_{t+1} + (1+r_t) S_t$$

The expected value of resource spending in the future is $E(C_{t+1}) = pC^h_{t+1} + (1-p)C^l_{t+1}$. The key property is that "expected marginal utility" is not the same as "marginal utility calculated at the expected value" of future resource spending. This property is related to pre-cautionary saving and Jensen's inequality in economics.

It is generally accepted to assume the third derivative of the utility function is positive: $u'''(C_t) > 0$. The third derivative is a measure of the curvature of marginal utility.

In the figure 3, one can see the third derivative being positive implies that marginal utility is bowed inside. Expected resource spending is $pC^h_{t+1} + (1-p)C^l_{t+1}$. Expected marginal utility is $pu'(C^h_{t+1})+(1-p)u'(C^l_{t+1})$. In the figure 3, one can calculate expected marginal utility by drawing a line between C^h_{t+1} and C^l_{t+1}, and calculating the value of the line at the expected value of resource spending. Based on Jensen's inequality $E(u'(C_{t+1})) > u'(E(C_{t+1}))$.

Figure 3. The impact of uncertainty and pre-cautionary saving
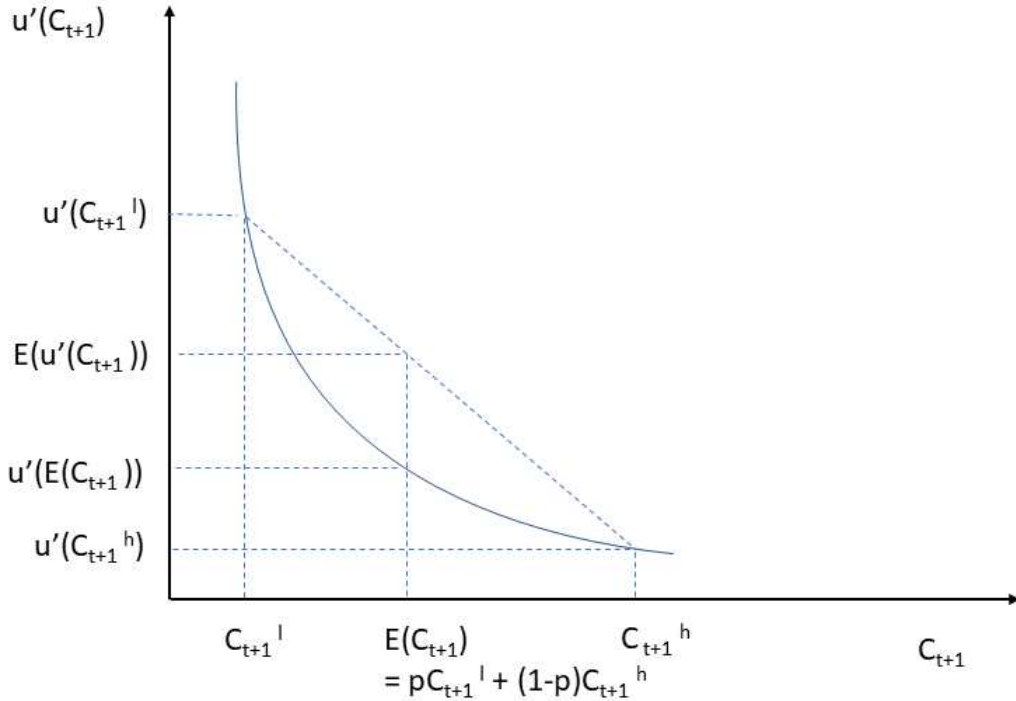
The marginal utility of future resource spending with uncertainty $E(u'(C_{t+1}))$ is higher than the marginal utility of future resource spending without uncertainty $u'(E(C_{t+1}))=u'(C_{t+1})$.

Reviewing the first order condition for maximization

$$u'(C_t) = \beta(1+r_t)E(u'(C_{t+1}))$$

one can quantitatively analyze the change with uncertainty.

Uncertainty must increase expected marginal utility $E(u'(C_{t+1}))$. The right hand side in the first order condition, thus increases. To make the maximization condition to equal, the left hand side must also get larger. This implies that the marginal utility of present resource spending must increase. Marginal utility of current resource spending getting larger requires current resource spending to decrease. In other words, the college graduate responds to uncertainty by trying to reduce current resource spending (therefore, saving increases). In economics, it is known as pre-cautionary saving. Put differently, the government gives subsidy to encourage more current resource spending for the firm (income effect). However, facing uncertainty the college graduate decreases current resource spending for the firm (precautionary saving).

When the magnitude of precautionary saving is larger than that of income effect, then the government subsidy cannot induce the planned goal. The government cannot promote the college to use more resources for a new firm. Moreover, in the period of t+1 (after the end of government support period), the college graduate can use the saved resource for her personal purpose by closing the firm.

4. An approach of game theory

The previous inter-temporal maximization analysis does not provide clear answer on whether the income effect is bigger than the pre-cautionary saving effect or not. If income effect is bigger than that of the pre-cautionary saving, then the government achieves its goal at least in the present period. An approach of game theory, however, indicates that it is difficult to achieve the governmental goal even in the present period.

Following Yoo (2014), the model assumes two players: a local government officer and a college graduate. When receiving the government subsidy, the college graduate has two strategies: "simply receiving subsidy" or "sincerely operating a firm". The local government officer also has two strategies: "provide minimum support" or "provide maximum support".

The college graduate can receive the government subsidy (B) with both strategies. It is because the government officer cannot distinguish whether her purpose is "simply receiving subsidy" or "sincerely operating a firm". When the college graduate attains the subsidy, the government officer also receives a payoff for completing government policy. Let assume that the payoff for

completing government policy is also B to the officer for a simple analysis.

If the goal of college graduate is simply receiving the subsidy, then the payoff (in terms of utility) of college graduate is just u(B). This means she does not put any additional effort to operate a firm, but closes the firm at the end of period t. If the goal of college graduate is sincerely operating a firm, then her payoff is uncertain. When the firm is successful, then her payoff is $u(Y^h_{t+1}+B)$; otherwise $u(Y^l_{t+1}+B)$. Let assume that expected value of her payoff is $0.5u(B+Y^h_{t+1}) + 0.5u(B+Y^l_{t+1})$ (suppose $Y^l_{t+1}=-Y^h_{t+1}$ and the probability of success is 0.5 only for this calculation).

When the government officer provides minimum support, then the payoff for the officer is just B. When the government office provide maximum support, then the payoff is B − e, where e is the cost for providing maximum support. The model assumes that with the maximum support of the government, the college graduate can get a benefit of e in addition to government subsidy (This is because the applicant gets supports across the related divisions in local government including paper works, more information on different subsidies, and cooperation across divisions. Maximum support greases the wheel of business). Finally when the college graduate sincerely operates a new firm and makes it a successful firm, then the government officer receives some tax revenue (due to the increased number of companies and hired workers) from the new firm, $\alpha*Y^h_{t+1}$.

Table 1 shows a payoff structure of the college graduate and the government officer.

Table 1. Payoff Structure for Government Officer and College Graduate

		College Graduate	
		Simply Receiving Subsidy	Sincerely Operating Firm
Government Officer	Minimum Support	B, u(B)	$B+\alpha*Y^h_{t+1}$, $0.5u(B+Y^h_{t+1}) + 0.5u(B+Y^l_{t+1})$
	Maximum Support	B−e, u(B)+e	$B+\alpha*Y^h_{t+1}−e$, $0.5[u(B+Y^h_{t+1})+e]+0.5[u(B+Y^l_{t+1})+e]$

Note. The upper number denotes the government officer's payoff. The lower number denotes the college graduate's payoff.

Figure 4. Concave Utility Function and Jensen's Inequality
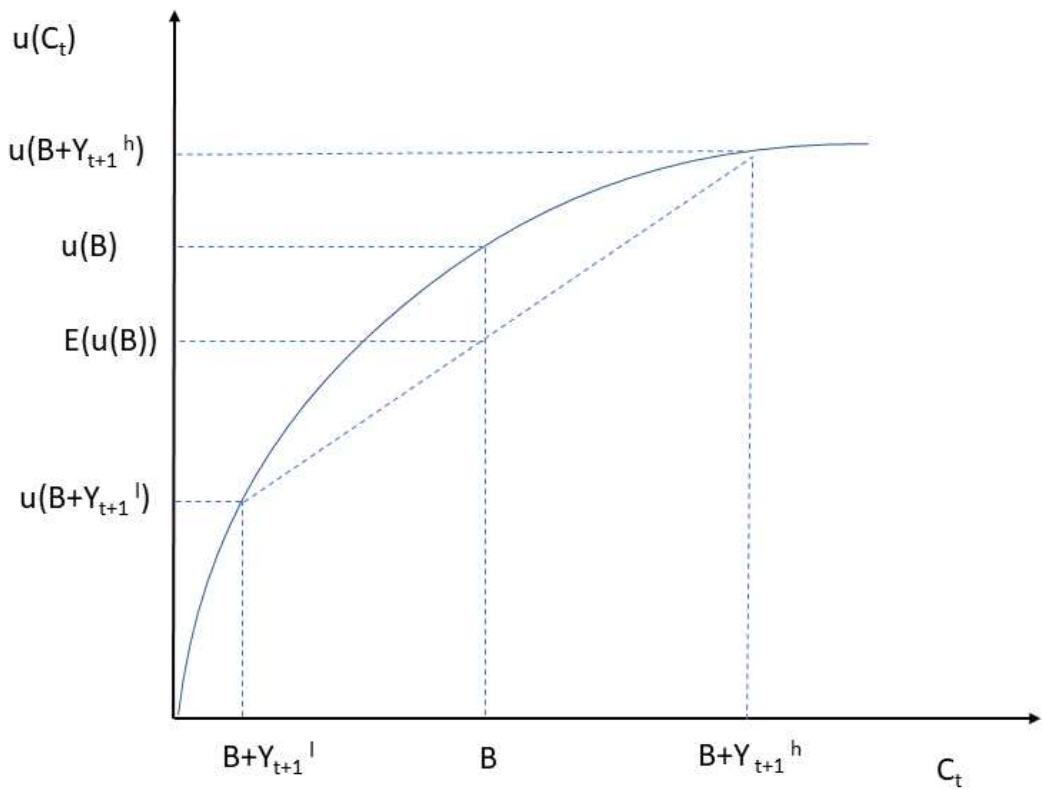
In this game, the government officer's dominant strategy is "providing minimum support". Given that the college graduate chooses "simply receiving subsidy", the cost of providing maximum support discourages to choose "providing maximum support" (B 〉 B-e). Similarly, given that the college graduate operates a firm sincerely, providing maximum support is not a dominant strategy (B+α*Y$^h_{t+1}$ 〉 B+α*Y$^h_{t+1}$-e). Thus, the dominant strategy of the officer is "minimum support".

The dominant strategy of college graduate is "simply receiving subsidy". Given that the government officer chooses "minimum support", with uncertainty and concave utility function, u(B) is larger than E(u(B))=0.5u(B+Y$^h_{t+1}$) + 0.5u(B+Y$^l_{t+1}$) (This property is also related to Jensen's inequality, see figure 4). Similarly, given that the government officer chooses "maximum support", with uncertainty and concave utility function, u(B)+e is larger than E(u(B)+e)=0.5[u(B+Y$^h_{t+1}$)+e] + 0.5[u(B+Y$^l_{t+1}$)+e]. Thus, the dominant strategy of the college graduate is "simply receiving subsidy".

In sum, the set of dominant strategies in this game is "minimum support" and "simply receiving subsidy". Furthermore, "simply receiving subsidy" is consistent with spending less resources in the present period with uncertainty (pre-cautionary saving motives).

Ⅲ. Policy Implication

Although local government does its best within its capability, it is difficult to encourage new startups. The capability of government, fettered by its responsibilities, is very narrow. The local governments are generally required to make a progress within one year because of the annual review. The budget for startup programs will be audited by the central government. Without visible results, the budget for local government for the next year may decrease. Thus, the local government cannot but focus on a quick result (for example, local government A spends 1.5 million dollars for hiring parking staff members). Unsustainable firms can meet the criteria for governmental reviews, but have little economic impacts in decreasing actual unemployment rates.

The central government also recognizes that haste result demanding will not solve the current unemployment problems. Thus, the central government also requires a long-term project such as a building logistic center for young entrepreneurs. However, most young entrepreneurs do not have any real business experiences at the beginning. In other words, most young entrepreneurs will not succeed in their first try. Securing some support from the government such as a logistic center is definitely helpful. However, the chance of making a successful firm is still very low even with the government support.

In his book, *Mass Flourishing: How grassroots innovation created jobs, challenge, and change*, Edmund Phelps (2006 Nobel Prize Winner in Economics) discusses the foundations of modern economy. He argues that the activeness in realizing new innovative ideas is one of the cultural foundations of modern economy. In other words, when the suppliers of new ideas can make companies freely under various supporting institutions, the innovations propagates widely and efficiently. The argument of Phelps (2006) is consistent with the main idea of supporting new startups by young generation. His argument is focused on the comparison of the US and Europe, but the core idea is still applicable to many countries.

One example of the economic institution that allows economic freedom is bankruptcy. In the US, before 1833, it was common that insolvent people were sent to a prison. However, the introduction of the bankruptcy system weakened the punishment of default; thus businessmen were protected from the failure due to bad luck or mistakes. This helped the establishment of a company and the propagation of innovation.

Pelphs (2013) argues that corporatism discourages modern economic development. Corporatism, in simple terms, means an effective control of private capital by government. For example, it claims 1) all sectors should develop equally, 2) the inequality in savings and investments should be corrected. It also aims 1) redistribution through social insurance, 2)

balancing GDP (gross domestic product) through social corporation. The goals of corporatism include government-oriented investment, compromise between employers and employees, social responsibility, employment protection, universal social security, and regulating work hours.

Pelphs (2013) claims that corporatism, in fact, discouraged innovative ideas. The government-oriented policies made the companies rely on the government directions (and subsidies), not innovative ideas. Pursuing macro-economic stability designed by the government generally resulted micro-economic collusive ties between politics and business. Consequently, innovative people choose to follow the government directions (and subsidies), instead of pursuing new ideas. One can observe similar behavior in social firms supported by government in Korea.

Although local government is doing a great job in startup supporting programs, its capability is very limited for many reasons as Pelphs (2013) discussed. Local government needs to balance 1) a short-term and a long-term plans; 2) socially and politically correct programs within secured budgets. These constraints tend to lead "minimum service" rather than "maximum service" combined with a conservative government structure. The plans of government in last twenty years might be reviewed as successful every year in the government's annual evaluation in the perspective of "minimum service", but honestly, failed to provide "maximum service".

Changing a conservative government structure is unreal in the short run. Under these circumstances, it is difficult to encourage entrepreneurship. Then, what government needs to do might be providing a social safety net for young generations when they fail. For example, government can make a funding for providing bankruptcy services for failed young entrepreneurs. Young entrepreneurs with limited experiences are very likely to fail several times. However, with government-funded legal services in helping to file a personal bankruptcy, young entrepreneurs may be successful in their next tries.

Current individual bankruptcy system has two major components: personal bankruptcy and individual financial workout. The core of personal bankruptcy is debt exemption. It is known that about 90% of applicant attains debt exemption. Missing a required document may lead to not allowing debt exemption and the result is critical: the applicant needs to pay back the debt and cannot apply for the bankruptcy for the same debt.

Personal bankruptcy uses the applicant's current wealth for paying debts. In contrast, individual financial workout uses the applicant's future income for paying debts. Thus, if the applicant can expect stable future income, then it is recommended to use individual financial workout. With individual financial workout, the applicant can keep basic living expenses from her income and the remainder is used for paying debts for three years (amended from five years to three years in 2017). However, personal financial workout requires more documents and time.

Most college graduates are ignorant and overwhelmed on individual bankruptcy. They also do

not know that individual bankruptcy can serve as social safety nets for failure. Although young entrepreneurs know about bankruptcy, heavy paperworks can be terrifying. Under these circumstances providing more detailed information on personal bankruptcy and financial aids for hiring a lawyer for heavy paperworks can facilitate entrepreneurship.

Providing social safety nets for failure also can induce moral hazard problems. However, the economic efficiency for bankruptcy funds seems to be higher than that of hiring young generations as parking staff members.

The model of this paper supports the positive impact of affordable bankruptcy as a policy. At the presence of uncertainty, affordable bankruptcy decreases the degree of uncertainty in the inter-temporal maximization problem. In figure 5, introducing affordable bankruptcy moves C_{t+1}^l to "C_{t+1}^S with bankruptcy" (superscript S denotes social safety nets). Then $E(C_{t+1})$ moves to "$E(C_{t+1})$ with bankruptcy". Finally, "$E(u'(C_{t+1}))$ with bankruptcy" is similar to $E(u'(C_{t+1}))$, implying pre-cautionary saving is less likely to happen because the social safety net decreases uncertainty.

Figure 5. The impact of bankruptcy at the presence of uncertainty
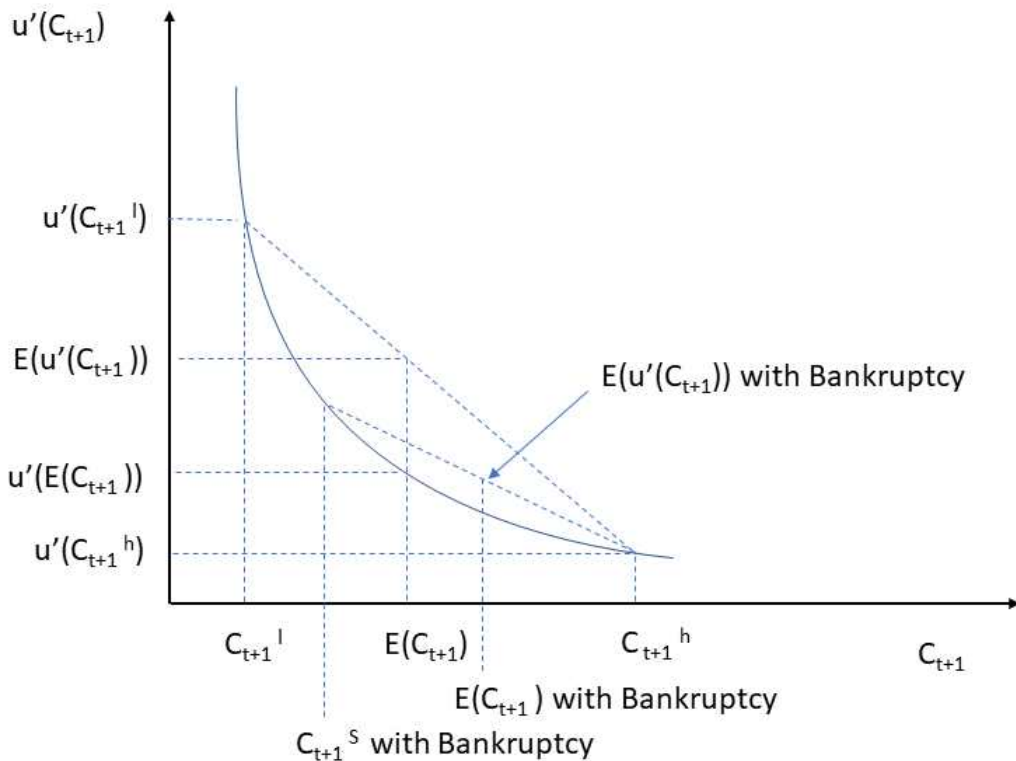
Ⅳ. Conclusion

Korean economy has maintained relatively stable economic growth rates since the 1970s, but Korean economy has not been able to create enough good jobs since the late 1990s. Korean government has recognized the importance of job creation, and has put substantial efforts and budgets for making new firms by young generation. However, the government solutions, honestly, failed in last twenty years. College graduates feel "lost" in planning their futures and the problem is getting worse.

This paper analyzes local government startup supporting programs and provides policy implications. The economic analysis indicates that local government may do its best in supporting startups within their capabilities, but current supporting programs are not an economic optimum.

Facing uncertainty, a new businessman has little incentive to use her resources for the new firm. Principles of pre-cautionary saving is consistent with 1) simply receiving government subsidies, 2) closing the firm at the end of supporting period, and 3) use the saved resources for personal purposes. In order to overcome this pre-cautionary saving motives, economic analysis suggests to reduce uncertainty. For example, decreasing uncertainty via social safety nets, including affordable personal bankruptcy for young businessmen, can improve the problem.

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유동우(兪東佑): Ohio State University-Columbus 대학원에서 경제학박사학위를 취득 (Institutions and Economic Growth, 2011)하고, 울산대학교 부교수로 재직중이다. 관심분야는 제도와 경제성장이며 주요 논문으로, "Constitutional Bargaining and the Quality of Contemporary African Institutions: A Test of the Incremental Reform Hypothesis" (Journal of Institutional Economics, 2018), "A Quantitative Study on Endogenous Formation of Comparative Advantage in South Korea" (International Review of Economics and Finance, 2018) 등이 있다. 주요 경력은 West Virginia University 조교수(2011-2016) 등이다(dongwooyoo@ulsan.ac.kr).

국문요약

지방정부의 창업지원정책: 경제학적 접근

<div align="right">유동우</div>

본 논문은 지방정부의 창업지원정책을 경제학적으로 분석한다. 창업지원 정책의 효율성을 분석하기 위하여, 시차가 있는 극대화 모형과 게임이론을 사용하였다. 분석결과, 불확실성이 존재할 경우, "단순히 보조금 수령하기" 전략이 "기업을 성실하게 운영하기" 전략에 대하여 지배전략으로 나타났다. 불확실성은 창업자에게 더 많은 예비적 저축을 하게 만들고, 지원기간동안 보다 적은 자원을 기업에 사용하도록 하였다. 연구결과 적은 비용의 파산제도와 같은 사회안전망을 통하여 불확실성을 줄이는 것이 창업정책의 문제점을 개선할 수 있을 것으로 분석되었다.

주제어: 창업지원, 예비적 저축, 파산, 시차가 있는 극대화, 불확실성