CY-ICER 2014

Should universities be subsidized? – A reference point view

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Abstract

Because of the central importance of higher education and its long-turn positive extern effects on the whole society, the government often might wish to enforce its will on the universities through the subsidy it provides to them. Thus the question arises: what are the welfare consequences of state subsidies offered to universities? I try to answer this question with the recently developed tools of the so-called reference point theory, established by Oliver Hart and his coauthors. In my model the two participants are the government and the university. Exclusively a rector controls the university and the representative of the government is the administrator. The objective of the administrator is to maximize public welfare, whereas the rector maximizes her own payoff. The administrator offers a subsidy that comes together with the obligation to fulfill the state's instructions. Since these 'handcuffs' are usually against the rector's own interest, but subsidy is valuable to the rector, there is a tradeoff. I investigate the optimal behavior of the rector in two cases: a private university and a state owned public university. In spite of the simplified assumptions, this setup undoubtedly shows the ambiguous nature of subsidies.

1. Introduction

Studying in higher education not only increases the future welfare of the students, but also provides positive extern effects on the whole society, hence government often subsidizes higher education, and in exchange also tries to enforce its will. An example of this phenomenon can be the higher education in the former communist countries, where a great bulk of university places are still (or were, until the recent years) state financed. In exchange in many cases the state might even interfere with the choice of the rector. In the literature there are instances of dealing with the crowding out and efficiency effects of the state subsidy in higher education (Barr, 2004).

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Thus, the question arises: what the welfare consequences of state subsidies offered to universities are? In my paper I try to answer this question with the recently developed tools of the so-called reference point theory, which - to the best of my knowledge - has not been applied to problems in the area of public relationships, and especially to questions related to state and universities.

The main idea of reference point theory is that contracts could be fulfilled either in perfunctory or consummate ways. While consummate fulfillment of the contract is in the spirit of the contract, perfunctory fulfillment is only strictly according to the prescriptions in the contract. A new term of 'shading' was introduced by Hart (2008), Hart & Moore (2008), Hart (2009), and Hart (2011). When the realized payoff of one of the parties (A) is worse than what is expected a priori from the contract, then she feels aggrieved and acts in a way that decreases the other party's (B's) payoff, i.e. party A shades on performance. As regards expectations about future payoffs, the initial contract is adopted as a reference point, and these expectations are assumed to be within the boundaries of the contract. Contracts that serve as reference points can prevent parties from shading too much. In my paper I highlight how well reference point theory fits to the relationship between the state and state-owned or private universities. In spite of the simplified assumptions, this setup undoubtedly shows the ambiguous nature of subsidies in higher education.

2. Main relationships

The participants of my model are the university and the government. Both represented by one person, the university by the rector (she) and the government by the administrator (he). The initial decisions belong to the administrator. He decides whether he wants the university to work under his ownership, or allows the university to be a private institute. The government also decides on the amount of subsidy, which is represented by s. The decision regarding s is based on the biggest difference between the positive external effects from the subsidy and the amount of the subsidy. We assume that subsidizing the university by the amount $s \geq 0$ results in positive externality $e(s)$, where $e(s)$ is the maximum amount, which could be achieved using s amount of subsidy. The function $e(s)$ has the following characteristics: $e'(s) > 0$, $e''(s) \leq 0$, and there is a s, such that $e(s) > s$. Due to these assumptions there exists a unique $s = s^*$ for which $\max_s(e(s) - s) = e(s^*) - s^*$. The benevolent administrator, as a utility maximize, in our model always chooses s^* amount of subsidy, or does not give subsidy at all.

Then the rector of a private university decides whether to accept the subsidy or not. However, the rector of a state university must obey the wish of the administrator. She is obliged to accept subsidy if he offers it to her.
The organizational form is selected in the first stage. Simultaneously, the amount of the subsidy is also determined in this stage. Next, each actor chooses Y or N, for giving (or accepting) subsidy. We assume that subsidy also means the right to interfere with the rector's policy, and the administrator uses this right to obtain $[e(s^*) - s^*]$ net result of the subsidy. The state owned university must accept what the government wants. The rector of the private university is free to decide whether to accept the subsidy. If she accepts state subsidy she also has to fulfill the state's wishes. To keep my model simple, I abstract away from corruption, asymmetric information and from uncertainty both from the rector's, and from the administrator's part. However, the rector can shade the administrator if she feels aggrieved.

We assume that there is no shading opportunity ex ante, and organizational form is chosen upon tradition and upon the not necessarily rational belief of the benevolent administrator, i.e. he chooses a form what he thinks will result in the highest welfare level to the society. In the long run he always chooses the form of proprietorship, which yields the highest welfare, but in the short run there could be deviations from the optimal ownership. When the administrator insists on state ownership it is because he believes it to be the best for the society. Regarding the rector of the state university (motivated by Hart & Holmstrom, 2010) there is a potential for her ex post shading if she is not satisfied with the subvention. To fix ideas, think of shading as accepting the prescribed number of newcomers entering the university, but not providing them such a high quality of education, which would have been provided otherwise. We show that the state ownership can cause deadweight loss through the shading consequence of the subsidy. The gross result of the decision about subsidy (providing and accepting) can be seen in the matrix below (Figure 1).

	Administrator	
	Yes	No

		Yes	No
Rector	Yes	$\Delta\Pi_u, \Delta e_g$	0,0
	No	0,0	0,0

Figure 1: Payoffs

In Figure 1, $\Delta\Pi_u$ refers to the gross change of the surplus of the university, and, Δe_g refers to the gross change of positive externality. We do not lose generality if, similarly to Hart & Holmstrom (2010), we normalize profits, so that in the 'no' cases gross payoff is zero for both the rector and administrator. In contrast to Hart and Holmstrom (2010), there is no need to distinguish between monetary profit and private benefit, because the administrator cares about each element of social surplus: the total amount of surplus counts for him. Therefore, it does not matter whether the rector's surplus consists of only profit, or both profit and private benefit. Thus, if the rector's private benefit decreases, the administrator will feel himself worse too. The administrator's direct payoff is the positive externality resulting from the subsidy. Gross surplus (gross payoff) does not account for the costs of agreement, which depends on the ex ante defined organizational form and ex post decisions (Y or N).

2.1. Private university

The rector wants to be subsidized if:

$$\Delta\Pi_u + s \geq 0 \tag{1}$$

The administrator wants to give subsidy if:

$$\Delta\Pi_u + \Delta e_g \geq 0 \tag{2}$$

If (1) and (2) hold, the social surplus, W equals:

$$W = \Delta\Pi_u + \Delta e_g \tag{3}$$

However, when (2) holds but (1) does not, the administrator would choose to subsidize, although the rector refuses subsidy, and social surplus is just equal to the university's profit.

$$W = 0 \tag{4}$$

We assume that the benevolent administrator never shades. This does not mean that the social surplus wouldn't be higher if the rector accepted the subsidy. See the explanation below regarding the rector of the state university, when she must accept the subsidy against her wish.

2.2. State university

If (1) and (2) hold, organizational form does not matter. Social surplus is defined by (3). However, when (2) holds but (1) does not, the administrator can still force the rector to accept subsidy. She must accept the owner's subsidy, and behave according to his wishes, but she will shade. The rector is shading by $\theta(\Delta\Pi + s)$, where $0 \leq \theta \leq 1$ is the shading parameter, like in Hart and Holmstrom (2010). Instead of (2), the government's decision rule will be defined based on whether (5) holds or not

$$\Delta\Pi_u + \Delta e_g + \theta(\Delta\Pi_u + s) \geq 0 \tag{5}$$

If (5) holds, social surplus - as always in this model - equals the government's net payoff:

W=$\Delta\Pi_u + \Delta e_g + \theta(\Delta\Pi_u + s)$ (6)

When (2) holds, but (1) does not, it means that $\Delta\Pi_u + s < 0 \leq \Delta\Pi_u + \Delta e_g$. In the above case, the question emerges whether providing the subsidy was an effective way to increase social welfare. We answer this question in the following section.

3. Subsidy and effectiveness

Subsidy is most successful if it not only increases the positive extern effect more than its own amount, but also raises the profit of the university. We assume that this happens rarely, because the direct aim of the subsidy was to increase the positive extern effect of the university's teaching, and the university's profit was not the question. Increasing the university's profit could be counted as a side effect. The positive extern effect of graduation increases mainly as a result of the expansion of the number of university's students. The subsidy comes together with the state's wish regarding the university's policy, and the rector cannot follow the most profitable strategy for herself. Thus, her profit decreases compared to the case without state intervention. However, the university can be compensated by the subsidy. If the university is at least as well off with the subsidy, as without it, there is no shading. The possible scenarios when the universities own profit is negative due to the persuaded policy are summarized in Table 1.

Table 1. The welfare effect of the subsidy, when $\Delta\Pi_u < 0$

Profit	Shading	Social Surplus
$|\Delta\Pi_u| < s$	No	$\Delta\Pi_u + \Delta e_g > \text{-s} + \Delta e_g$
$|\Delta\Pi_u| = s$	No	$\Delta\Pi_u + \Delta e_g = -s + \Delta e_g$
$|\Delta\Pi_u| > s$	Yes	$\Delta\Pi_u + \Delta e_g + \theta(\Delta\Pi_u + s) < -s + \Delta e_g + \varepsilon$

In Table 1, $\epsilon < 0$ is the amount of shading, $\theta(\Delta\Pi_u + s)$. We use the notation $NE = -s + \Delta e_g$, where NE is the net externality, i.e. the externality of the subsidy net of the money (externality minus subsidy). Because assumptions, $NE > 0$. If the rector has a loss, but the loss (the absolute value of her payoff) is less than the subsidy, there is no shading; otherwise she is going to shade. In the case of the state university there are two kinds of deadweight losses.

- Type 1. The decrease of the university's profit is $|\Delta\Pi_u|$, but $W > NE$ still holds.
- Type 2. In addition to the decrease of the university's profit $W < NE$. This scenario is represented in the third row of Table 2.

Type 1 deadweight loss does not stop the subsidizing mechanism in spite of the fact that it interferes with the university's profit. Altogether, the net result of the subsidy in terms of social surplus is positive. However, the emphasis in our model is on the Type 2 externality. It shows that, due to the ownership structure, subsidy results in less net social surplus than the difference of positive externality and the amount of subsidy. This type of deadweight loss arises only if the university is in state ownership. Because (5) holds, the subsidy results in positive social welfare (surplus) even in the case of type 2 deadweight losses. But the social surplus can be very small, and the higher the shading, the smaller the social surplus is. If the social surplus is small, it means very low effectiveness of the subsidy. Using the same amount of s^* could probably result in much more surplus in other areas of the economy. It also has to be taken into consideration that collecting the money for the subsidy is a painful process, which causes deadweight loss in itself, and if money is already collected it should be used in the most effective manner.

In our model two types of errors can occur. We call subsidization error the situation when subsidy is provided, but because $\square < NE$, the increase in welfare is less than the net positive externality. Subsidization error occurs only if the university belongs to the government, as it was demonstrated above. The other error, the no-subsidization error

occurs only in the case of the private university. Because the rector of the private university takes into consideration only her own profit, if (2) does not hold, she will refuse the subsidy. If subsidy resulted in $W > NE$, than rejecting it would make the society worse off. Even if this was the case, the private rector could not be enforced to accept the subsidy.

4. Conclusions

We analyzed the consequence of subsidy through the relationship of the state and a university. We assumed that subsidy could increase the positive extern effect of university education, taking into consideration the whole number of students who graduates. This effect could be so strong, that even if it decreases the direct profit of the university the society would be better off. We used the reference point framework, established by Oliver Hart and his coauthors, to show how the university's rector expresses her agreement if she is enforced to accept subsidy. The state can force subsidy, even if it reduces the net payoff of the rector, but the rector shades in such cases. She shades on performance, but still insists on per functionary fulfillment of the original contract with the state.

Our model was based on the simplest assumptions, nevertheless we were able to show that there exists a situation when forcing subsidy, and subsequently requiring to follow the state's wishes, could cause harm to the society. In such a case the subsidy is used very ineffectively: the increase of the social welfare is less than the difference of the positive externality (caused by the subsidy) and the subsidy. However, the symmetric situation also exits: declining the subsidy by the rector of a private university can deprive the society the welfare increase which could otherwise be higher than the net effect of the subsidy.

If, in the long run, the organizational form, which maximizes expected future surplus of the society is ensured, neither subsidization error, nor no-subsidization error would occur. It is left for future research to investigate how adding more sophisticated elements to the model - e.g. taking risk into consideration, assuming not fully benevolent government, etc. - would change the results of this paper.

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