

Picci, Lucio

**Working Paper**

## The Reputational Budget and its Uses

Quaderni - Working Paper DSE, No. 587

**Provided in Cooperation with:**

University of Bologna, Department of Economics

*Suggested Citation:* Picci, Lucio (2007) : The Reputational Budget and its Uses, Quaderni - Working Paper DSE, No. 587, Alma Mater Studiorum - Università di Bologna, Dipartimento di Scienze Economiche (DSE), Bologna,  
<https://doi.org/10.6092/unibo/amsacta/4697>

This Version is available at:

<https://hdl.handle.net/10419/159428>

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# The Reputational Budget and its Uses

Lucio Picci

Second draft: February 2007

To be presented at the First World Meeting of the Public Choice Society, Amsterdam,  
March 29-April 1, 2007

## **Abstract**

I introduce the concept of the reputational budget, to consider its possible uses within a Reputation-based Governance (Rebag) framework. The concept is illustrated using an application to the management of public works, where firms help public administrations in building public infrastructure.

The reputational budget has several interesting applications. In particular, it provides objective criteria to use reputational information in public procurement, and it may alleviate the moral hazard problem that arises in the life-cycle of bureaucrats.

## **Keywords**

Reputation-based Governance, Rebag, Reputational budget, Reputation, Public Works

**J.E.L. codes: D7, H1 H4, H5**

\* Department of Economics, Strada Maggiore 45, 40125 Bologna, Italy. E-mail: [lucio.picci@unibo.it](mailto:lucio.picci@unibo.it); Web page: <http://www.spbo.unibo.it/picci>. I thank Raimondello Orsini for valuable comments.



“Сегодня мы работаем на репутацию.  
Завтра репутация будет работать на нас”  
Russian saying<sup>1</sup>.

## 1. Introduction

Reputational considerations play an obvious role in public choice. Electors are influenced by the reputation of candidates, and the choice of political appointees to some extent depends on their past record. Deals and alliances are made, or not made, according to convenience and also to the perceived trustfulness of one’s partner. The importance of reputation encompasses both the public and the private sphere. “Word of mouth” plays a key role in determining societal outcomes, ranging from serious matters, to very mundane problems, such as the choice of the restaurant where to dine<sup>2</sup>.

Recently, the diffusion of appropriate Internet-based information systems has allowed for a more formal management of reputational considerations within decision-making processes. An example is provided by the eBay auction site, where buyers and sellers can cast a vote on the quality of their relation with their business partner. Such assessments remain visible and constitute the basis for the computation of what amounts to an index of reputation. In this context, the Internet allows for a “digitalization of word-of-mouth” (Dellarocas, 2003).

In Picci (2007a, 2007b) I propose a comprehensive framework to address governance issues, that I call Reputation-based Governance. Such framework employs a dedicated Internet-based information system containing a set of very detailed

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<sup>1</sup> Translation: “Today we work for our reputation. Tomorrow our reputation will work for us.”

<sup>2</sup> The concept of reputation (and of trust) can be considered using two alternative sets of game theoretic tools. Reputation can be seen in a moral hazard setting using the Folk Theorem: in an infinitely repeated game, players may prefer the long-run benefit of not cheating, to the short-run advantage of cheating. Also, reputation can be considered in an adverse selection setting, for example within a bayesian game context, where the quality of a player is not immediately evident to others. See Cabral, 2005, for details and for a formal definition of concepts.

information on policies and, most importantly, where all the interested parties may post their assessments of the outcomes of those policies. The assessments reverberate to the actors of governance and allow for the computation of an index of their reputation. Such reputations, in turn, provide both ex-post and ex-ante desirable incentives to the relevant actors.

In Picci (2007a) I consider an application of Reputation-based Governance to the management of public works. Reputation-based governance of public works is based on the availability of a suitable information system where all projects to build public infrastructures are described. Upon completion of each project, the relevant public administration assesses the quality of the work carried out by the contracting firms. These, in turn, are allowed to rate how the public administration has managed the project.

A key element of reputation-based governance of public works is the fact that the citizens who are affected by a given project are allowed to assess the information system, in order to declare what they think about its outcome. Assessments are quantitative, while there may be a possibility of also leaving comments expressed in natural language. All the quantitative assessments received by one project, appropriately weighted and aggregated, form an overall index of its perceived quality. These information then propagate to the firms and to the administrations that contributed to the execution of the projects, and allow for the computation of their reputations. The reputation of an actor of governance, in the end, is a function of the perceived outcomes of the projects carried out by that actor over time.

In this paper I consider again the application of reputation-based governance to the management of public works, so as to provide a concrete setting to illustrate a new concept, that I call the “reputational budget”. The reputational budget is a number expressing “how much reputation” an actor of governance has accumulated. It is different from reputation proper, because, unlike it, the reputational budget is also a function of the size of the projects. The differences between reputation proper, and the reputational budget, have implications that are important enough to justify the introduction of a new concept.

The paper proceeds as follows. In the next section, I illustrate a simple example of computation of the reputational budget. Then, I suggest how the reputational budget could be used. The conclusions follow.

## **2. The Reputational budget**

Consider a public administration executing a number of public works, each one with the help of a single contracting firm. Table 1 shows the example that will lead us through the illustration of the reputational budget. For simplicity, assume that the works have been executed only in two years, 2007 (“this year”) and 2006 (“last year”). Assume further that there are a total of 9 firms, identified in Column 1 of Table 1, and that each one of them has contracted two projects, of varying dimensions, one in each year.

To simplify matters, we assume that upon completion of a project, only the citizens who are affected by it are allowed to express their assessments. This is done thanks to an Internet-based information system where all the projects are listed, and their characteristics summarized. Also, we assume that only a single dimension of the project (say, “overall quality”) can be assessed by the public. Votes may be assumed to range from 0 (very bad) to 5 (excellent)<sup>3</sup>.

Column 2 of Table 1 reports the overall assessment received by each project, typically computed as the average, or the median, of all the assessments cast by each citizen. Here we do not specify the individual assessments, and we simply report their hypothetical aggregate. Column 3 indicates the size of the project, expressed, say, in thousands of Euros. We assume that projects’ outcomes lose relevance as time goes by,

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<sup>3</sup> As noted above, in the unabridged formulation of reputation-based governance of public works, public administration and firms rate each other, and the overall rating of a firm is a weighted average of the valuations that its projects received by both the public and by public administrations. Also, assessments of a completed project may be on more than one dimension. See Picci 2007a and Picci 2007b. A demonstrator of the Internet-based information system supporting a reputation-based governance of public works (available at <http://fire.ei.unibo.it:8080/rebagware/>) is illustrated in Confalonieri et. al., 2007.

with a time discount factor equal to 0.8. Column 4 shows the time discounted values of projects. The sizes of last year's projects are multiplied by the time discount factor, while this year's projects are not discounted.

The reputation of each firm is a weighted average of the assessments received by its projects. Doing well on bigger projects, or in more recent ones, influences overall reputation more than doing well in small or remote projects. Column 9 shows the reputations of the nine firms, computed as:

$$(1) \quad R_i = as_{i,2006} \cdot \frac{pv_{i,2006}}{pv_{i,2006} + pv_{i,2007}} + as_{i,2007} \cdot \frac{pv_{i,2007}}{pv_{i,2006} + pv_{i,2007}}$$

where  $R_i$  is the reputational score of firm  $i$ , and  $as_{i,year}$  is the assessment received by the project carried out by firm  $i$  in a given year.  $pv_{i,year}$  indicates the present value of the same project. For firm 1, reputation is obtained as:

$$(1') \quad 3.286 = 4 \cdot \frac{120}{120 + 300} + 3 \cdot \frac{300}{120 + 300}$$

Reputational scores do not contain information on the relative size of the relative importance of firms. So for example, if two firms carried out the same number of projects each year, with one firm doing projects twice as big than the other, and both firms have received exactly the same assessments, they would have the same reputational score. An example is provided by the outcomes of firm n. 1 and of firm n. 7 in Table 1. The two firms received the same assessments each year, and they have the same reputation (equal to 3.286), even if the projects of firm n. 7 were twice the size of those of firm n. 1.

The idea of the reputational budget is to develop a metric of the assessments where the size of the projects matters. Obviously, there are many ways to make this idea operational. To narrow down the field of possible candidates, we establish that the reputational budget should have the following characteristics.

- a) Every year, all firms are allocated a certain number of reputational points, some positive, some negative, so that the sum of the reputational points allocated equals zero.



- b) The reputational points that are allocated depend linearly on the size of the projects, so that, coeteris paribus, if a project is twice as big as another project, it commands twice as many reputational points.
- c) The reputational budget of a firm is equal to the sum of the time discounted reputational points it has received over time. The sum of the reputational budgets of all firms is zero.

Columns 5, 6 and 7 of Table 1 show the computation of reputational points satisfying the properties listed above<sup>4</sup>. Column 5 computes a set of weights, expressing the assessments while considering the size of the related projected. For each firm, these are equal to the overall assessment times the share of the firm's project within the sum of the projects carried out by all firms in a given year:

$$(2) \quad w_{i,year} = as_{i,year} \cdot \frac{pv_{i,year}}{\sum_{i=1}^k pv_{i,year}}$$

$w_{i,year}$  is the weight of firm  $i$  in a given year. It is equal to the assessment,  $as_{i,year}$ , times the relative share of the present value of that firm's project in a given year, within the overall present value of all projects carried out in that year. In the summation symbol at the denominator of the fraction,  $k$  is the number of firms (and of projects executed in a given year), 9 in our example.

To clarify further, consider that for firm 1, in year 2006, such weighted assessment equals:

$$(2') \quad 0.154 = 4 \cdot \frac{120}{3120}$$

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<sup>4</sup> A note on terminology. Reputation, reputation index, and reputation score are synonymes. Reputational points, on the other hand, are the units that form a reputational budget.

Column 6 shows the demeaned assessments. They are equal to the assessments minus the average weighted assessments, which is simply the sum of the weights of Column 5:

$$(3) \quad asdem_{i,year} = as_{i,year} - \sum_{i=1}^k w_i$$

For firm 1 in 2006, the value is:

$$(3') \quad 1.708 = 4 - 2.292$$

Column 7, finally, computes the reputational points, equal to the demeaned assessments of Column 6 times the present value of the project carried out in a given year:

$$(4) \quad RP_{i,year} = asdem_{i,year} * pv_{i,year}$$

For firm 1 in 2006, the value is obtained as:

$$(4') \quad 204.923 = 1.708 * 120$$

Column 10 shows the reputational budget for each firm, simply obtained as the sum over the two years of the time discounted reputational points:

$$(5) \quad RB_i = RP_{i,2006} + RP_{i,2007}$$

For firm 1, the reputational budget is equal to:

$$(5') \quad 113.62 = 204.923 - 91.304$$

Note that the sum in fact, as required by condition c) above, time discounts the reputation points of past years, since they are computed using the present value of projects – see equation (4). Also, the sum across firms of the reputational budgets is equal to zero, and the reputational points in a given year sum to zero (see the bottom of column 10 and, for each year, the bottom of column 7). Moreover, note that such computations satisfy property b) above, as again it is made clear by a comparison of firm 1 and 7: The two firms receive the same assessment in each year, and the latter

carried out projects that are exactly twice as big as the former. As already noted, their reputation is identical, but the reputational budget of firm n. 7 is twice that of firm n. 1 (227.237 reputational points vs. 113.619).

Reallocating reputational points (for example, through trading – more on the issue below) immediately allows for a recomputation of reputation. In particular, it can be easily shown that if at the end of each year all firms sell their reputational points (or buy them if they own a negative quantity of them), the following happens. First, demand for reputational points equals supply, since the reputational points given out every year sum to zero by construction. Second, at the end of this exchange, every firm will have a reputation that equals the weighted average of individual reputations<sup>5</sup>.

### **3. Uses of the reputational budget**

Within an application of Reputation-based Governance to the management of public works, the reputational budget could be used in two broad ways. First, the public administration may consider the reputational budget within the source selection process. Second, firms may trade reputational points. We consider these two possibilities in turn.

Using reputation considerations within public procurement is not a novelty. In the United States, in the 1990s a reform in public procurement effectively forced public officials to consider the reputation of the bidder in source selection, together with price and perceived quality of the proposal (Kelman, 2002). There, the reputation of the firms is assessed by the source selection official, after consulting a database where public administrators routinely record their assessments of the performances of the firms they interact with, and eventually other sources.

The present context is different in many respects. First, within Reputation-based Governance, assessing the outcome of projects is not the precinct of bureaucrats, but it includes the citizenry. A further important difference, with respect to current practices in the United States, could follow from the adoption of the reputational budget. In the

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<sup>5</sup> See the bottom of column 5 in Table 1. Strictly speaking, this property holds exactly only when there is a firm whose reputation is equal to such a weighted average - a firm with exactly zero reputational points. This will be true with a continuum of firms.

context of a reputation-based governance, the public administration could accept tender proposals by firms whose reputation, or reputational budget, is above a certain threshold.

There is an important difference between fixing a threshold in terms of the reputation and doing it in terms of the reputational budget. As noted above, the reputational score (i.e., reputation) does not depend on the relative importance of the firm, while the reputational budget does. In fact, the reputational budget conveys information on how good, or bad, a given firm was, *and* on the size of the projects it carried out. So for example, defining a cut-off point in order to be admitted in the bidding process that equals the first percentile of the reputational budgets of all firms<sup>6</sup>, would in fact select firms that typically are of size above average – or that are of medium size, but that performed very well in the past.

Such a rule would make sense when the size or complexity of projects suggests not to give the job to a small firm. In those cases, the administration may desire to deal with a big firm that has done at least reasonably well in the past, but at the same time may be willing to give smaller firms a chance, provided that they have shown to be exceptional performers. Using the reputational budget to define a cut-off point, in other words, would incorporate in the considerations of the public administration the presence of a trade-off between the reputation and the size of the firm. On the other hand, if the size of the project is small, the public administration may desire to define a cut-off rule for presenting a bid that is a function of the reputation, instead than of the reputational budget, expressing in this way its indifference with respect to the size of the bidding firms.

Of more interest is the case where we admit the possibility that firms trade reputational points. In order to discuss the implications of such a possibility, it is useful first to consider some previous contributions. Holmström (1982) studies the lifetime evolution of career concerns, to conclude that these may be too strong at the early stages of a career, and too weak as retirement age approaches. The intuition behind his result

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<sup>6</sup> Note that the average of the reputational budgets is zero by construction. The median, as opposed to the mean (or sum), of the reputational budgets may be positive or negative, depending on the distribution of the assessments.

may be seen in a simple moral hazard repeated game. As the end date of the game approaches, the future expected stream of payoffs tends to vanish, and “cheating” today becomes a more advantageous prospect compared to the early stages of the game (see Kreps et al., 1980).

In this context, trading reputation may be of help in setting the incentives straight. Fama (1980) already noted that managers may be disciplined by the fact that their reputation today positively influences the expected pay that they may secure by moving to another firm – a situation where the “trading of reputation” is in fact taken care of by the presence of a market for managerial labor.

A possibility for trading reputation is by trading brand names. To analyze how such a possibility affects life-cycle incentives (of firms’ owners) to exert effort – again, in the spirit of Holmström – Tadelis (2002) considers a model both of moral hazard and of adverse selection, to conclude that such trading of brand names provides the sought-for incentives to build a good reputation – i.e., past good behaviours are rewarded – and that it alleviates the moral hazard problem even with short-lived agents.

However, Tadelis’ results, as he himself clearly states, are conditional on the assumption that clients do not observe such trading in reputation (brand names). Otherwise, since the model is also one of adverse selection, clients would take the buying of someone else’s reputation as a sign of bad quality. We witness here one of those cases where the availability of more information leads to worse overall outcomes, as in Hirshleifer (1971), and as discussed more generally in Bassan et al. (2003). Tadelis concludes that, for example, secrecy “is not reasonable in all industries (e.g., medical practices)” – which, for the particular case cited, comes as sobering news for the reader. According to Tadelis, the “model of the paper [...] seems to fit small owner-operated firms with transient clients, such as restaurants and small service businesses, but is harder to link to larger firms.” Note also that the market for reputation illustrated by Tadelis is in fact “only” a market for brand names. Sales of brand names are perforce rare, and the ensuing lack of thickness of the market does not bode well for its efficient functioning.

In this respect, the computation of a reputational budget would innovate in several ways. First, reputational points could be traded at any time, allowing for the presence of a well functioning market, not limited to rare purchases of someone else’s

brand name. Second, a market for reputational points could more easily guarantee the secrecy that is necessary in Tadelis' treatment, given that the very visible brand names not only would not change hands, but also that they may even eventually become irrelevant.

Different institutional solutions may be devised in order for reputation points to be exchanged and for reputational budgets to be balanced. For example, firms could be required to balance their reputational budget by the end of each year, so as to carry over to the next year zero reputational points. For this purpose, a market could function, say, for a period of time at the end of each year, where firms could trade reputational points. Just as market forces impose balancing a budget, so an appropriate institutional set-up could impose firms to start a new year with non-negative reputational points (which is just the same as asking all firms to equalize their reputations by trading reputational points). In public procurement, such a result could be obtained by adopting a rule establishing that public administrations can only admit tender proposals from firms whose reputation is not below average. In this way, firms interested in public contracts and having a negative reputational budget would have a compelling incentive to buy reputational points, and firms with a positive reputational budget would increase their profits by selling theirs.

Such a market for reputation would also present firms with interesting opportunities for arbitrage. Assume for example that firms differ in technology in the following way. Some firms have a comparative advantage in producing at low cost, but are relatively inefficient when it comes to providing high quality products or services. Other firms are the opposite. Trading reputational points would then allow firms to exploit their comparative advantages. Firms of the first type would find it convenient to focus on what they can do well – produce cheaply – expecting that they will obtain below average assessments, but knowing that they will be able to buy the needed reputational points on the market. Firms with a comparative advantage in quality would also focus on what they can do well, i.e., acquiring reputational points that they would later sell to the low-cost firms<sup>7</sup>.

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<sup>7</sup> If, as in Tadelis (2002), trading in reputation remains secret, public administrations would not separate the type of the firm that they face – low cost, or high quality. Such a lack of

Last, the presence of a market for reputation in fact allows the public administration not to *directly* consider reputation in source selection, thus requiring less of an institutional change. At the closing of the market, all firms would have the same reputation (and zero reputational points). Good performances are prized because they command reputational points that can later be sold. The role of reputation in source selection would in fact be present, but it would be mediated by the presence of a market for reputation.

#### **4. Discussion and conclusions**

I have illustrated the concept of the reputational budget considering a typical public procurement problem. Reputational budgeting, just as the framework of reputation-based governance into which it is embedded, has a more general applicability. For example, reputational points could be traded by bureaucrats who are forced to balance their reputational budgets at the end of each year, using part of their salary. True, in such a context an unconstrained market for reputational points could be seen as running the risk of reverting the public administration to a pre-Weberian and patrimonial model of bureaucracy: In order to recoup the moneys spent for the reputational points needed to remain viable as a public official, some bureaucrats would provide strong incentives for rent seeking activities, or for plain corruption. A more modest solution could however be obtained simply by making a fixed part of the bureaucrat's salary conditional on the reputational points acquired every year.

Reputational budgeting could also be used within the private sector. However, the framework of Reputation-based Governance puts a strong emphasis on the democratic accountability of public policies. The quantification of the reputational budget derives from the assessments of policies as carried out by the citizens (and also by other actors of governance). Within Reputation-based Governance, the possibility of

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separation has in itself a cost, because there are projects for which one type of firm could be preferred to the other. For example, in a case where quality correlates positively with the ability to carry out complex projects, it would be beneficial to the administration facing one such project to choose a high quality firm.

such a systematic assessment, and its relevance in the ensuing allocation of resources (and of power), plays the important role of providing a channel for the legitimization of policies that runs parallel to their traditional legitimization through democratic elections. Such a dimension of the problem is inevitably lost when the concept of the reputational budget is applied to the private sphere. True, recent emphasis on the social accountability of private actors may suggest a wider applicability of the concept of Reputation-based Governance, and of the instrument of the reputational budget.



## References

- Bassan, Bruno; Gossner, O.; Scarsini, Marco e Shmuel Zamir (2003) “Positive value of information in games”, *International Journal of Game Theory*, Vol. N. 32, pp. 17–31.
- Cabral, Luis (2005) *The Economics of Reputation and Trust*, mimeo
- Confalonieri, Roberto; Leoni, Cristiano and Picci, Lucio (2007), “Rebag-Ware: Reputation-based Governance of Public Works, mimeo [available on-line: <http://www.spbo.unibo.it/picci/Rebag-Ware-IST-Africa2007.pdf>]
- Dellarocas, Chrysanthos, (2003), *The Digitalization of Word of Mouth: Promise and Challenge of Online Feedback Mechanisms*, *Management Science*, Vol. 49, No. 10, pp. 1407-1424.
- Fama, Eugene F., 1980, *Agency Problems and the Theory of the Firm*, *The Journal of Political Economy*, Vol. 88, No. 2, pp. 288-307
- Hirshleifer, Jack (1971), “The Private and Social Value of Information and the Reward to Inventive Activity”, *American Economic Review*, Vol. 61, pp. 561-574
- Holmström, B (1982), “Managerial Incentive Problems: a Dynamic Perspective”, in *Essays in Economics and Management in Honor of Lars Wahlbeck* (Helsinki: Swedish School of Economics).
- Kelman, Steven (2002), *Remaking Federal Procurement*, *Public Contracts Law Journal*, Summer
- K Kreps, David.; Milgrom, Paul R.; Roberts, John; and Wilson, Robert J. (1982) “Rational Cooperation in the Finitely Repeated Prisoners’ Dilemma.” *J. Econ. Theory* 27, 245–52.
- Picci, Lucio (2007a), *Reputation-based Governance of Public Works*, in G. Piga and Khi V. Thai, *Economics of Public Procurement*, Palgrave. [Available on-line: <http://www.spbo.unibo.it/picci/rebag-publicworks.pdf> ]
- Picci, Lucio (2007b), *Reputation-based Governance*, mimeo (in progress).
- Tadelis, Steven (2002), *The Market for Reputation as an Incentive Mechanism*, *Journal of Political Economy*, vol. 110, no. 4, pp. 854-882

**Table 1. Reputation scores and the reputational budget**

Columns:									
1	2	3	4	5	6	7	8	9	10
<b>Year 2006</b>									
<b>Firm <i>i</i></b>	$as_{i,year}$	Value.proj	$pv_{i,year}$	$w_{i,year}$	$asdem_{i,year}$	$RP_{i,year}$			
1	4	150	120	0.154	1.708	204.923			
2	3	800	640	0.615	0.708	452.923			
3	2	350	280	0.179	-0.292	-81.846			
4	0	50	40	0.000	-2.292	-91.692			
5	2	1100	880	0.564	-0.292	-257.231			
6	1	945	756	0.242	-1.292	-976.985			
7	4	300	240	0.308	1.708	409.846			
8	4	130	104	0.133	1.708	177.600			
9	5	75	60	0.096	2.708	162.462			
Avg=2.78		Σ=3900	Σ=3120	Σ=2.292	Σ=0				
<b>Year 2007</b>									
<b>Firm <i>i</i></b>	$as_{i,year}$	Value.proj	$pv_{i,year}$	$w_{i,year}$	$asdem_{i,year}$	$RP_{i,year}$	value works	$R_i$	$RB_i$
1	3	300	300	0.196	-0.304	-91.304	420	3.286	113.619
2	1	700	700	0.152	-2.304	-1613.043	1340	1.955	-1160.120
3	4	550	550	0.478	0.696	382.609	830	3.325	300.763
4	2	40	40	0.017	-1.304	-52.174	80	1.000	-143.866
5	4	950	950	0.826	0.696	660.870	1830	3.038	403.639
6	4	1300	1300	1.130	0.696	904.348	2056	2.897	-72.637
7	3	600	600	0.391	-0.304	-182.609	840	3.286	227.237
8	4	100	100	0.087	0.696	69.565	204	4.000	247.165
9	2	60	60	0.026	-1.304	-78.261	120	3.500	84.201
Avg=3		Σ=4600	Σ=4600	Σ=3.304	Σ=0		Σ=7720	Σ=0	

Note:

The time discount factor equals 0.8