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Katerina Marie DeHart
University of Puget Sound

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Providing Donors an Incentive for Ex Ante Investment in Disaster Relief

Katerina Marie DeHart
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A major concern for disaster relief today is the inefficiency of disaster relief efforts by disaster relief organizations (DROs). DROs, as non-profit organizations, rely considerably on donations. Donor-intent often leaves many DROs without the option of optimally allocating and utilizing these donations. Because donor intentions lean more towards immediate disaster relief rather than long term interests such as disaster prediction, prevention, and preparation, there tends to be a surplus of ex post investment and a shortage of ex ante investments for disaster relief. After identifying the economic reasons for a shortage of ex ante donor investment, this paper focuses on how to increase donations to ex ante efforts of DROs, arguing that increasing ex ante investment will help correct the inefficiency of ex post efforts. It concludes that DROs can take either a budget and cost approach or a utility and benefits approach towards increasing ex ante investment.

I. Introduction

Disasters tend to cause a lot of chaos; they wouldn't be considered so "disastrous" if they didn't. Thus, disaster relief often tends to be chaotic. In fact, chaos is commonly associated with disaster. But what if it were possible to reduce the chaos of a disaster and making such an event less "disastrous" for victims and aid workers? This paper shows that if more resources were allocated to predicting, preventing, and preparing for disasters among disaster relief organizations, post-disaster relief efforts would be less chaotic, and more efficient. Because characteristics of chaos such as disorganization lead to higher costs, disaster relief is seen as inefficient in its current chaotic state.

There are many reasons for the chaos after a disaster. The underlying reason for the inefficiency is the urgent nature of a disaster. The urgent nature puts a time constraint on disaster relief leading to two main inefficiencies. First, there is poor disaster management by DROs. Under a time constraint, DROs must quickly assess needs and allocate resources accordingly. Time is more valuable in times of disaster so the cost of time begins to outweigh efficiency, and DROs may waste other resources in order to save time. Second, because of the urgent nature of disasters, DROs may not be able to spend the time to prepare for disaster relief, which is why preparation should be done ahead of time in what we call ex ante disaster relief efforts.

The ex ante side of disaster relief is the investment in relief before a disaster occurs. This comes in the forms of disaster prevention, prediction, and preparation. Resources go into researching the ability to predict a disaster before it happens so that it can either be prevented or prepared for. A greater portion of resources go into preparation for a disaster. This can be anything from building a better infrastructure more able to handle a disaster, to insuring those with high-risk, to training disaster relief staff and volunteers.

In contrast to ex ante efforts, ex post efforts can be described as the actual disaster relief efforts made after the disaster has occurred. Ex post can be in the short-term and long-term. Short-term ex post efforts can include but is not limited to the rescue of disaster victims, immediate healthcare for ill or injured, food and shelter rebuilding of basic infrastructure; while long-term ex post efforts often include lifetime counseling for traumatized survivors, and foundations for victims and their families. DROs do not typically allocate funds for long-term ex post efforts initially, but limit their funding to

the remaining funds leftover after immediate disaster relief, because there often tends to be more money donated to disaster relief than needed. While a DRO may prefer to allocate this leftover money towards ex ante research and preparation finding it a more worthwhile investment in the longrun¹, donor-intent often restricts them to using funds for a specific cause or victims of a particular disaster. Thus, DROs often have to create foundations or scholarships and other long-term investments for victims and their families, rather than putting the funds where they find most beneficial and efficient.

So part of the inefficiency of disaster relief efforts is because of the shortage or undersupply of ex ante efforts as a result of donor preference in ex post aid. An increase in ex ante efforts would improve the efficiency of ex post disaster relief efforts in general. The reasoning behind this is that if more efforts are put into predicting, preparing, and preventing disasters, when a disaster actually comes DROs would be more prepared, making ex post disaster relief more efficient. If ex post relief was more efficient, then less resources would be needed to be devoted to it. In other words, if we were able to predict, prepare for, and prevent disasters, then we could reduce the cost of time as well as transaction costs of post disaster relief, making it more efficient. These costs would decrease with preparation because disaster relief efforts would be more organized.

In summary, the time constraint inherent to disaster relief is a main cause of the inefficiency, however the lack of ex ante investment does not help to relieve this constraint at all. Increased investment in ex ante efforts could relieve some of this time constraint; however donor-intent tends to lean away from ex ante investment towards ex

¹ Robert A. Katz argues that money spent on long-term disaster relief is wasteful because of the diminishing marginal utility, suggesting that it is a better allocation of resources to satisfy the short-term needs of more people for the same cost of providing long-run needs of a finite number of people (pp.272 & 281).

post, preventing DROs from being able to put some of their donated revenues towards ex ante investment to make ex post efforts more efficient under such a time constraint inherent to disaster relief. If DROs were not restricted by donor-intent and could invest more in ex ante efforts, they could be more prepared for disasters and thus increase efficiency of ex post relief efforts.

This paper has been written to bring light on ways to increase this ex ante investment from individual donors, so that ex post disaster relief efforts can be more efficient and less chaotic. Because donors invest through private donations, we are focusing on ways to increase private donations towards ex ante efforts. After identifying the economic reasons behind why donors prefer to invest in ex post efforts, we will be equipped to address how to increase ex ante investment.

II. Literature Review

The chaos of 9-11 and Hurricane Katrina relief efforts, initiated a great deal of discussion on the inefficiency of disaster relief efforts. Early literature simply pointed out that these disaster relief efforts were inefficient, while later literature began to ask why. It appears to be a general consensus among scholars that lack of preparedness for a disaster is the underlying source of inefficient relief efforts. More recently, empirical studies show that greater ex ante investment is in fact beneficial to ex post disaster relief.

Literary response to this realization began with a discussion on the inefficiencies in 9-11 and Hurricane Katrina relief efforts. Critique of such disaster relief ranged from the organizations to individuals to the government. A staff report from the U.S. House of Representatives of the 109th Congress's Subcommittee for Management, Integration, and

Oversight of the Committee on Homeland Security (2006) reflects on many of the failures of Federal assistance to New York after the 9/11 disaster. It discusses the failures and flaws in the managements system regarding waste, fraud, and abuse of disaster assistance, claiming the urgent-nature of disasters as a primary source for this abuse. They find that the expediting of relief delivery led to many oversights and systematic problems.² The government focused more on the charitable DRO side at the House Ways and Means Oversight Committee hearing on December 13, 2005 (Independent Sector, 2005). Again, the focus here was on fraud, showing that the government concerns are not unique to Federal agencies, but apply to non-profit DROs as well. The House Ways and Means Oversight Committee also expressed concern with the inefficiency that the lack of coordination among DROs causes in their hearing.

Later research shows that developed countries have a better response to disasters because they have had the capability to invest more in ex ante preparation for disasters (Mahul & Gurenko, 2006) providing evidence for the relationship between ex ante and ex post investment. Furthermore, the Panel on the Nonprofit Sector has recommended providing incentives to increase support of ongoing services and the sustainability of DROs, reflecting the emphasis on ex ante disaster research and preparation (Independent Sector, 2005).³ The Panel asks Congress to provide incentives that would cause increased public ex ante investment.

It is because of such a push that the non-profit sector has made significant strides already towards increasing ex ante investment. There has already been a structural

² The Subcommittee alleges that five systematic problems emerge due to the expediting of relief delivery – lack of information sharing and cooperation, inadequate verification prior to disbursing funds, duplicative payments, relaxed or ineffective controls, and weak oversight of procurement (p. 11).

³ It would be interesting to know whether or not the Panel has considered offering any incentives themselves.

response to this need for greater ex ante investment. Neil R. Britton (1991) noted the emergence of permanent disaster volunteers, an idea originating with Stoddard in 1969. However, although DROs are internally experiencing movement towards increased ex ante investment, research has yet to show an overall movement of donor intent from ex post to ex ante, despite the Nonprofit Sector Panel's attempt to get Congress to provide more donor incentives.

Perhaps once the sector better understands why donors prefer ex post investment to ex ante they would be better able to target incentives that could help move donor-intent more in their favor. Only recently has literature begun to emerge about the reasons for donor preference in ex post investment. In general, literature cites the reason for a shortage of donor investment in ex ante as too low of perceived benefits of ex ante investment on the part of donors. Reasons for this are related to the positive externalities of ex ante investment, the today's generation's high discount rates of the future, a substantial difference between an individual's perceived risk of disaster and their actual risk of disaster, as well as a lack of incentive for ex ante investment, and a budget constraint for the poor in particular.

A Positive Externality

A reason cited for lack of ex ante investment by the government, which can be adapted to individual donors in society, is that of positive horizontal political externalities (Depoorter, 2007). This means that when one government actor invests in ex ante efforts, other government actors benefit as well. However, no one takes into consideration these externalities when calculating their benefits of investing; they do not consider the benefit

on others of their investment or the benefit on themselves of others' investments. It is called a *horizontal* externality because it benefits other government actors who are on the same level as them. The reasoning behind this externality is that citizens tend to see the government as a single entity working together and sharing responsibility amongst its parts. When one government actor invests in ex ante efforts, the demand placed upon other actors to invest decrease because everyone shares the responsibility. People are more concerned with the total investment on the part of the government rather than how much each actor invests.

A Misperception of Disaster Probability and Risk

Related to these ideas on insurance, but also more directly relating to ex ante donations, are studies on the disparity between actual risk of disaster and perceived risk as a result of imperfect information (Kenreuther et al, 2004). Such studies suggest that people see themselves as zero or little risk when in fact they have quite a significant risk. Kenreuther et al says this misperception can be due to imperfect information, the inability to interpret information accurately, or the use of a threshold model when making decisions. It is said that the expected benefits of knowing the information is too high relative to the costs of getting the information for some people leading them to not gather the information (Kenreuther & Pauly, 2006). So sometimes people simply are not aware of their risk at all, while other times they have been given an inaccurate estimate of their risk. Still, there are times when accurate information on the probability or likelihood of disaster is available, but they do not know whether that statistic implies a high risk or low risk (Kenreuther et al). Moreover, on the other hand, there are those who use a threshold

model in which they compare their probability of disaster to a threshold probability; and if their probability is smaller than the threshold, they would tend to assume a zero probability altogether (Kenreuther et al).

A High Future Discount Rate

Furthermore, there has been discussion of discount rates of the future being too high for many of today's generations. Especially among politicians, but for any individual or group donor in general it appears too high. Scholars argue that discount rates of the future are especially high for politicians because their motives are political and related to elections. The discount rates for anything beyond re-election or their term of office is extremely high.

In regards to individuals, today's instant gratification society has the tendency to consume now rather than investment in anything long-term reflecting high future discount rates. Kenreuther et al (2004) points out these high discount rates of the future from looking at several studies on the lack of investment in energy-saving equipment. This need for instant gratification in today's society is further shown by people's increasing consumerism (Bauman 1998).

A Moral Hazard: Lack of Incentive

There is also a lack of incentive for people to invest in ex ante providing a moral hazard. Particularly for politicians whose term is ending and cannot be re-elected, there is little incentive to follow through with any promises for ex ante investment because there is no accountability. Re-election is often a way to hold politicians accountable. Shared

accountability among sectors of the government also provides a lack of incentive for an individual government actor to invest (Depoorter, 2007).

Similarly, for individual donations to ex ante disaster preparation efforts, the easy access and likelihood of ex post relief encourages free-riding, or the opportunity for people to receive ex post benefits without making ex ante investments. (Mahul & Gurenko, 2006, Kunreuther & Pauly, 2006). Scholars see this act of “haphazard public disaster relief” as a moral hazard for such organizations.

A Budget Constraint

Like donations, insurance is a type of ex ante investment. There is much study on insurance as a disaster preparation mechanism. Investment in insurance before a disaster provides for better relief after the disaster. Accordingly, theories on disaster insurance can be adapted to ex ante donations for disaster relief. Such studies show that budget limitations are a primary reason for less ex ante investment. Studies also show that underdeveloped insurance markets are a cause for lower investment in insurance for the poor in developing countries (Mahul & Gurenko, 2006), while in wealthier countries the poor are more likely not to invest in insurance because costs relative to benefits are too high when subject to tight budget constraints (Kenreuther & Pauly, 2006, Smith et al, 2006). And even if the benefits were higher as is the case for someone living in a high risk location, there are still those living “pay day to pay day” who cannot afford such expenses (Kenreuther & Pauly). In response to this, Mahul and Gurenko present a risk-financing framework, which suggests a variety of risk financing strategies for developing

countries. On the other hand, in wealthier countries it has been suggested to require or subsidize insurance to increase investment (Kenreuther & Pauly).

III. Economic Analysis

Currently DROs are operating in the inefficient state in which ex ante disaster relief investment is undersupplied. To reiterate, our understanding that ex ante investment is undersupplied comes from the idea that ex post disaster relief are inefficient partially due to the lack of preparation. If ex ante investment was to increase, DROs would be more prepared and ex post efforts would be more efficient. Thus, there exists an ex ante demand greater than is supplied.

Realizing now that increasing ex ante disaster relief investment will benefit ex post disaster relief effort, how do we get people to increase their investment in or donations to DROs' ex ante efforts? There are many studies on how budget constraints limit donations (Kenreuther et al, 2004, Kenreuther & Pauly, 2006, Mahul & Gurenko, 2006), but this paper also looks at how changing one's utility curves through tastes and preference could favor more ex ante investment as well. So far we have looked into reasons why there is *not* more investment in ex ante efforts. We have seen that positive externalities, higher than normal discount rates on the future and lower perceived risk rates, as well as budget limitations and a moral hazard problem push ex ante investment down. A change in any of these factors should accordingly affect a change in ex ante investment.

An expected utility maximization model

Looking at a basic expected utility maximizing model, we see that the person would donate D_A and have disposable income Y_A at the price of donations equal to P_D and the price of disposable income equal to P_Y . In this model, the person is able to maximize their utility at the point where the budget constraint is tangent to the indifference curve. Recall from basic economics that at this point, the price of donating relative to the price of disposable income (P_D/P_Y) equals the marginal rate of substitution of Y for D ($MRS_{Y,D}$).

A Utility and Benefit Approach

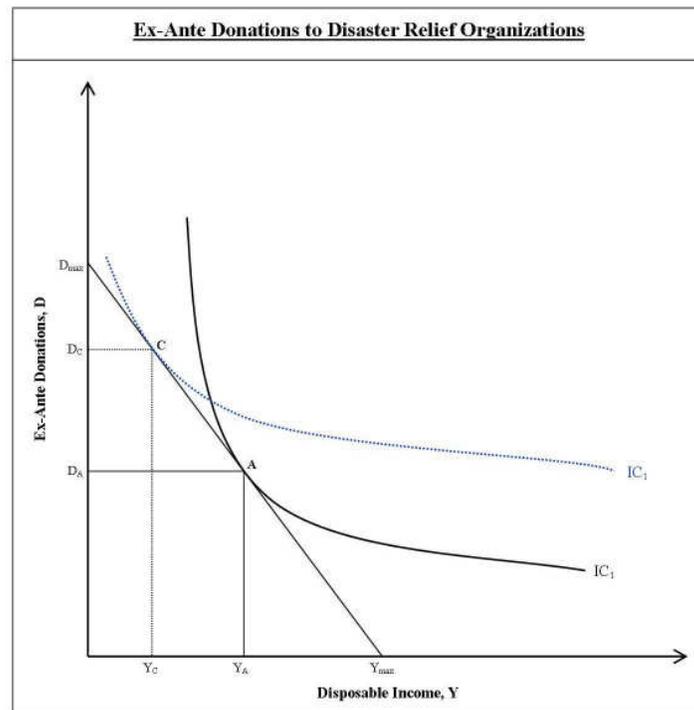
Individuals are misperceiving the benefits of ex ante investment as too low because of positive externalities. Similar to the positive horizontal political externality within government ex ante investment, there is a positive externality of individual donor investments in ex ante efforts as well. Just as with different government actors, when one individual invests in ex ante efforts, a portion of the aggregate demand has been met, and so the demand on individuals is somewhat alleviated.

Additionally, there is an external benefit of one's investment in ex ante disaster relief efforts on the greater community. Because disasters are usually massive, more ex ante investment could save their neighbor, friend, or even save their entire hometown community from entering the ruins forever. If people recognize these externalities and realize how much ex ante investment benefits everyone, not just themselves, they will consider this as a factor when deciding how much to donate. When people begin to realize the external benefits and then that the total benefits of their ex ante investment is

greater than their private benefits alone, their tastes and preferences may change in accordance and they may donate more.

A realization of the external benefits is reflected in the expected utility model as a flatter indifference curve as well as an up and leftward shift in the indifference curve. Similar to how a fad would affect one's indifference curve, a realization of external benefits has this effect as well. Because the marginal benefit of donations has increased relative to the marginal benefit of disposable income, donations are relatively more valuable, and so the $MRS_{Y,D}$ should decrease. The up and leftward shift in the curve represents the increased preference for donations in relation to disposable income.

Likewise, perfect risk assessment and decreased discount rates would affect one's perceived marginal benefit of donations relative to marginal benefit of disposable income. Assuming perceived risk is lower than actual risk in most cases, increasing risk perception to a level comparable to actual risk would increase one's perceived private benefit of investment in ex ante efforts. Decreasing discount rates for the future would further increase individuals' perceived benefits of ex ante investment, because it would increase their expected returns in the future. This would make ex ante investment now more valuable relative to disposable income. Just as positive externalities affected expected utility, increased risk perception and decreased discount rates would have a similar change in the expected utility curve as they both increase individuals' perceived benefits of ex ante investment. Therefore, a change in any or all of these variables would affect the person's expected total benefits as described and accordingly their utility curve, as shown in Figure 1 below.

Figure 1

While this diagram is intended to illustrate how a change in the expected utility could potentially increase ex ante investment from I_A to I_B , point B could also illustrate the efficient allocation of income. In this case, the dashed IC_1 curve would represent a person's actual utility and benefits at any given level of ex ante disaster relief investment, while the original solid curve would represent their current expected utility and benefits based on their imperfect risk information and high discount rates. The difference between points A and B in this diagram shows graphically how ex ante investment is undersupplied while disposable income is oversupplied when individuals' expected utility curves are not comparable to their actual utility curves. The ideal affect on expected utility would be for the person's expected utility curve to become equal to their actual utility curve, because this is the most efficient level of allocation of income. In the

case that it moves even farther, there would become a surplus of ex ante investment, which would be equally inefficient.

A Budget and Cost Approach

Another approach DROs could take to increase ex ante donations would be to alter the budget constraint curve for donors by manipulating the relative marginal cost or price of donating. This could be done several ways. The first way is to increase the cost of not donating, while the second way would be to decrease the cost of donating.

The lack of incentive and accountability provides a moral hazard problem. The cost of not donating is too low because individuals only suffer from external costs. They do not suffer from private costs because they end up receiving free public disaster relief in the aftermath of the disaster whether they invested in ex ante programs or not.

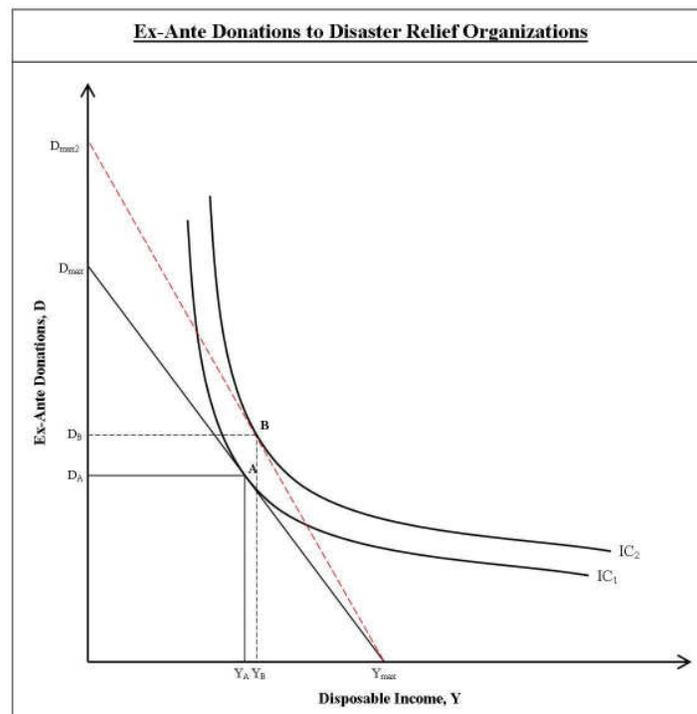
Establishing an incentive program or holding individuals accountable would increase the costs of not donating. If individuals realized that they would suffer consequences for donating less than the efficient level of ex ante donations, this would be an incentive for them to donate more.

Income tax deductions can be seen as a type of incentive to donate. However, income tax deductions decrease the cost of donating rather than increase the cost of not donating. An income tax deduction has two main effects on the quantity of donations. Tax deductions decrease the cost of donating through the price effect, which can be decomposed into a substitution effect and an income effect. Both the substitution and income effects here lead to an increase in ex ante investment. Relative price changes are

the reasoning behind the substitution effect, while an increase in real income as a result of the fall in price explains the income effect part of the price effect.

On the other hand, although income tax deductions decrease the price of donations through the price effect, income taxes in general decrease one's income through the tax income effect. This effect is counteractive to the price effect, however, historically it has a relatively small effect on overall ex ante investment in comparison to the price effect. Figure 2 below illustrates the increase in ex ante investment that can occur as a result of such an overall shift in the budget constraint curve.

Figure 2



IV. Discussion and Conclusion

In conclusion, DROs can take two approaches towards increasing donations to their ex ante efforts. One is a budget and cost approach, the other a utility and benefits or

returns approach. While the earlier may be easier to accomplish with quicker results, it bears many ethical issues that make the latter approach seem more appealing.

To change the budget line is something the government and DROs can do directly by either discriminating post-disaster relief efforts or changing tax policies. Not providing post-disaster relief to those who have not made pre-disaster investments would create an incentive and fix the moral hazard problem. In economic terms, this would increase the cost of *not* investing, which can be interpreted as a relative decrease in the price of investing as well. The other option DROs could petition the government for would be to increase tax-deductions on ex ante donations at the least or decrease income tax in general. Either of these tax options would cause the relative price in donating to ex ante efforts to decrease as well.

Several problems arise with each of these cost-altering approaches however. Ethical issues clearly arise with the discrimination against those who did not invest in disaster relief prior to the event at such a life-threatening and crucial time as the immediate aftermath of a disaster. In addition, compiling detailed information on who has donated or invested in ex ante and how much they have donated is difficult and inefficient in a time of emergency. Although this is essentially what insurance companies do, insurance companies are a for-profit institution. Whether an individual took precautionary measures, people generally would agree that they still have the right to life and safety. Rather, the debate is over whose responsibility it is to ensure that everyone gets this right.

Tax rates, on the other hand, are always under debate in Congress, showing that it is another issue in itself. Should taxes be increased or decreased and by how much?

These debates go for tax-deductions as well. There is an opportunity for tax-deduction discrimination, meaning donors receive different sized deductions depending on to whom or what they give. The reason for this issue with taxes is that they are not autonomous. Taxes are related to and affect numerous other variables today on top of income, including market prices, government spending, inflation, etc., that these factors must be taken into consideration when discussing potentially changing tax rates.

Therefore, although such changes in the budget would be easier and more feasible with a quicker response, attempts to influence donors' expected utility curves may be more well-received because of the various issues surrounding budget constraint manipulations. DROs should instead focus on decreasing discrepancies between perceived risk and actual risk, private benefits and social benefits, as well as decreasing discount rates. Seeing this discrepancy as an information asymmetry, each of these changes would occur through education. The people need to know more and better information about reality. Thus, DROs should try to increase information delivery in frequency and amount. They should also make an effort to reduce the delivery costs of information for those individuals who view the costs of getting information to be too high relative to its benefits. They should try to reach a greater populous with emphasis on higher risk areas, and deliver accurate up-to-date information in terms that they people with understand. For example, as Kenreuther et al (2004) says, people may know they have a one in one-hundred thousand chance of disaster, but do not know how to interpret this accurately They see it as a small number, representing very little to no risk, when chances of risk are in fact quite high.

People need to be shown how to better analyze risk – how it varies and how to interpret it. In addition, when one's risk increases, individuals need to know either when it happens or be shown how to recognize this. Additionally, education on the external benefits of ex ante investment would be another way such organizations could decrease the difference between actual total benefits and perceived private benefits. DROs can increase awareness for total benefits by educating donors on the externalities of their ex ante investment, in showing them that donations would not only benefit themselves directly by saving their house or their life, but also their favorite store, or their neighbors or friends houses. In this case, the donor's perceived benefits would move towards alignment with the actual benefits they receive.

Finally, such organizations can influence discount rates by making the future seem more valuable. They can do this by making it seem nearer, as well as more influential to other areas in their life. They can also show donors that the returns to their investment do not diminish as quick as they think, or that they may not diminish at all. Again, each of these would be accomplished through outreach efforts and education.

There may be evidence that even when accurate information is available individuals do not necessarily consider it; however, there is also evidence that how the information is presented or framed can influence investment decisions (Kenreuther et. al, 2004). Although there have been some empirical studies on the expected utility model (Kenreuther & Pauly, 2006), an empirical study on each of these variables is lacking. In addition, empirical studies on the effectiveness of each of the strategies for improvement in ex ante investment would be beneficial to DROs. Hopefully such a study would

suggest which approaches to take so DROs waste fewer resources targeting ineffective campaigns, and future post disaster relief efforts are much more efficient.

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