DELAY DISCOUNTING OF DIFFERENT COMMODITIES VARIES AS A FUNCTION OF POLITICAL PARTY AFFILIATION IN A COLLEGE SAMPLE

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ABSTRACT: Delay discounting has been used as a measure of both self control and of value for a particular commodity. Two hundred sixty five college psychology students who self identified as being either a Democrat or a Republican completed a delay-discounting task involving five different commodities (two monetary values, retirement income, Federal legislation, and medical treatment). Analyzing the area under the discounting curve, results showed that Democrats discounted all commodities to a greater extent than did Republicans. These results may suggest that Democrats are more apt than Republicans to prefer immediate results or that they value these commodities to a lesser degree than Republicans. Members of both parties, however, displayed similar changes in discounting across commodities, indicating a similar pattern of relative values.
KEYWORDS: Democrats, Republicans, delay discounting, college students

Within behavioral psychology, self control refers to choosing a larger amount of some positive outcome that will be available in the future rather than accepting a lesser amount of that outcome that is available more immediately (e.g., see Logue, 1995, for a review).[2] Determining when an individual will switch from waiting for the larger outcome to preferring a smaller, but more immediate outcome has developed into a large literature on the topic of delay discounting (see Madden & Bickel, 2010, for a recent review). Interest in self control (and delay discounting) has grown over the decades for several reasons. For one, research suggests that children's ability to display this behavior is predictive of positive life outcomes (Mischel, Shoda, & Rodriquez, 1989). Next, how

[2] Likewise, for aversive events, self control would be defined as choosing a smaller, more immediate unpleasant consequence rather than waiting for a more delayed, but larger, unpleasant consequence.

individuals discount delayed rewards has been shown to correlate with certain psychological disorders (e.g., pathological gambling; Dixon, Marley, & Jacobs, 2003). Others (e.g., Hardisty & Weber, 2009) have argued that knowledge about how individuals discount certain commodities can be an important factor in making public-policy decisions.

The measure of delay discounting is not a single-faceted indicator of a particular construct. As the above suggests, one can potentially view it as a measure of self control (or impulsivity). This view would potentially explain its correlation with certain psychological disorders (e.g., pathological gambling; Dixon et al., 2003). However, the relationship between measures of delay discounting and other psychometric measures designed to assess "impulsivity" is not a clear or reliable one (see Smith & Hantula, 2008, for a discussion). One possible reason for the less-than-perfect correlation between discounting and measures of impulsivity is that although the latter measure is often viewed as a trait characteristic, the former is potentially influenced by both state and trait factors (e.g., see Odum & Baumann, 2010, for a discussion).

Another facet of delay discounting is as a measure of value. Research has shown that there is an inverse relationship between the rate of delay discounting of a commodity and the value of that commodity, a finding that has been labeled as the magnitude effect (Chapman, 1996). For instance, someone might be willing to take $90 today rather than waiting one year for $100. However, that same individual might not be willing to take $90,000 today rather than waiting one year for $100,000. Thus, the delay of one year results in a greater relative decrease in the present value of the smaller commodity (i.e., at least a 10% decrease in the value of $100) than of the larger commodity.

In general, members of the different major political parties in the United States (i.e., the Democratic and Republican parties) hold different values. In behavioral terms, declaring oneself as a member of a political party is itself an operant. However, the assumption is that this declaration may be predictive of what consequences may or may not be reinforcing.

At a psychological/behavioral level, research has demonstrated that members of the different political parties differ in the values they hold. Sheldon and Nichols (2009) reported that, across four studies, Republicans consistently scored higher in extrinsic values (e.g., money) than intrinsic values (e.g., helping) relative to their Democratic counterparts. In one of their studies, Sheldon and Nichols also reported that Democrats scored higher in prosocial values than did Republicans. Other research has suggested that members of the different parties evaluate political speeches differently as a function of the rhetoric presented in the speech (Garst & Bodenhausen, 1996). Democrats and Republicans also appear to

differ in their preferred news sources, even for news stories that are apolitical (Iyengar & Hahn, 2009).

To our knowledge, no study has yet investigated whether members of the different parties differ in how they discount delayed outcomes. Doing so could be informative in a number of ways. For one, delay discounting is a multi-dimensional measure that not only requires the respondent to identify a relative value of a commodity, but also allows the researcher to determine how that value changes across time. By measuring the discounting of different commodities in a within-subject design, it may be possible to identify whether the members of the different political parties differ in the pattern of their decision making. That is, although members of one party might discount delayed monetary outcomes more so than members of the other party, members of both parties might discount a monetary outcome to a greater degree than they would some non-monetary commodity (e.g., their own personal health). Such a finding would suggest that, although members of the different political parties place different absolute weights on certain consequences, they hold a similar view of the value of the consequences relative to one another. Of course, the opposite result would suggest that members of the different political parties not only hold different absolute values, but also different relative values.

The present study recruited college undergraduates to complete a delay-discounting task that involved five different commodities. The first two were monetary amounts (i.e., $1,000 & $100,000). Given the results reported by Sheldon and Nichols (2009), it was predicted that Democrats would display more discounting of monetary amounts than would Republicans. Two different monetary amounts were included as a manipulations check. Specifically, because of the magnitude effect (Chapman, 1996), one would expect to see more discounting of the smaller, than of the larger, amount. The third commodity was retirement income. This particular commodity incorporated both a material (i.e., money) and a personal aspect. Again, given Sheldon and Nichols (2009) results, one might predict that Democrats would display more discounting of this commodity than would Republicans because of the material aspect of the commodity. The fourth commodity was Federal Legislation. Because Democrats, relative to Republicans, tend to favor strong Federal oversight, it was predicted that Republicans would display more discounting of this commodity than would Democrats. The final commodity was personal medical treatment. The author is not aware of any research that would suggest that Democrats and Republicans would differ in their valuation of their own personal health. Thus, I did not make an *a priori* prediction about whether they would differ in their rate of discounting of this particular commodity.

Method

Participants

The original sample of participants was 489 undergraduates psychology students (335 female, 154 male) enrolled at the University of North Dakota. Of these participants, 121 identified their political party affiliation as Democrat, 159 as Republican, 50 as Independent, and 158 as Other/Don't Know. The present study only utilized participants who identified their political party affiliation and who also provided the demographic information that would be used as covariates in the statistical analysis. The final sample consisted of 111 participants who self identified as Democrats and 154 who self identified as Republicans. In terms of gender, 181 of the participants were female and 84 were male. The mean age of these 265 participants was 19.85 years (SD = 2.48 years). The mean reported grade point average was 3.39 out of 4.00 (SD = 0.61). In terms of ethnicity, 248 participants (93.6%) reported being Caucasian, 7 (2.6%) reported being American Indian, and 10 (3.8%) reported being of some other ethnicity. Two hundred thirty seven (89.4%) of the participants reported an annual income of less than $25,000. When asked if they regularly attended church services, 104 (39.2%) participants reported they regularly attended whereas 161 (60.8%) reported that they did not.

Materials and Procedure

Participants completed the study in their psychology course. Each participant received a packet that consisted of an informed consent form that outlined the study as approved by the Institution Review Board at the University of North Dakota, a demographic survey that asked about the information reported in the participants section, and a series of delay-discounting questions that asked about five different commodities.

The commodities were $1,000 they were owed, $100,000 they were owed, their annual retirement income, Federal education legislation, and medical treatment. A list of the exact questions is found in the Appendix. The present study utilized what is known as the fill-in-the-blank method (Chapman, 1996; Smith & Hantula, 2008; Weatherly, Derenne, & Terrell, 2010). With this method, the participant is asked to generate an amount or percentage of the particular commodity that s/he would accept immediately rather than waiting a specified amount of time for the full amount or percentage. The same eight delays were used for each of the commodities, ranging from one week to 10 years across questions. Thus, participants completed 40 delay-discounting questions (5 commodities X 8 delays for each). Prior to distributing the questionnaire packets,

those 40 questions were randomly ordered. All participants then completed the questions in that order.

Data Analysis

Previous research has utilized several different techniques for analyzing delay-discounting data. One popular method is to fit the following hyperbolic equation to the data across the different delays (e.g., Mazur, 1987):

$V = A / (1 + kD)$ (Equation 1)

In Equation 1, V represents the subjective value of the delayed outcome, A represents the amount or percentage of the commodity, D represents the delay to the full amount or percentage of the commodity, and k is a free parameter that describes the rate of discounting.

A second way of analyzing discounting data is to use the following equation to measure the area under the curve (AUC) formed by the discounting data (Myerson, Green, & Warusawitharana, 2001):

$(x_2 - x_1) \times [(y_1 + y_2)/2]$ (Equation 2)

By using Equation 2, the AUC is calculated by summing the areas of the trapezoids created across the different delays. Smaller values of AUC represent more discounting of that commodity.

The present study utilized Equation 2 and AUC as the measure of delay discounting for the following reasons. First, as Myerson et al. (2001) argued, Equation 1 assumes that delay discounting takes a certain form. Although Equation 1 has successfully described delay-discounting data in numerous published studies, we had no theoretical reason to expect that the present data would conform to a hyperbolic function. Equation 2 does not presume that the data will take a certain form. Second, whereas k in Equation 1 results in a skewed distribution that requires data transformation, AUC in Equation 2 does not create such a difficulty. Third, Equation 1 did not provide an adequate fit to the present data, accounting for less than 60% of the variance on average. Thus, AUC was used in the analyses that follow.

Results

Figure 1 presents the AUC values that were observed for members of the different political parties for each of the five commodities. Figure 1 shows that the magnitude effect (Chapman, 1996) was observed, with members of both political parties displaying greater discounting of $1,000 than of $100,000. Regardless of political party affiliation, the greatest rate of discounting was observed for the commodity of $1,000 and the least discounting was observed for annual

retirement income. Discounting did appear to differ as a function of political party affiliation, with Democrats displaying a greater degree of delay discounting than Republicans for every commodity. However, the pattern of discounting across the different commodities appeared to be similar for respondents from both parties.

The results from statistical analyses confirmed the above impressions. The AUC values of individual participants for each commodity were subjected to a two-way (Political party X Commodity) mixed-model analysis of covariance. In this analysis, political party served as the grouping factor and commodity served as a repeated measure. Participants' gender, ethnicity, annual income, and report-
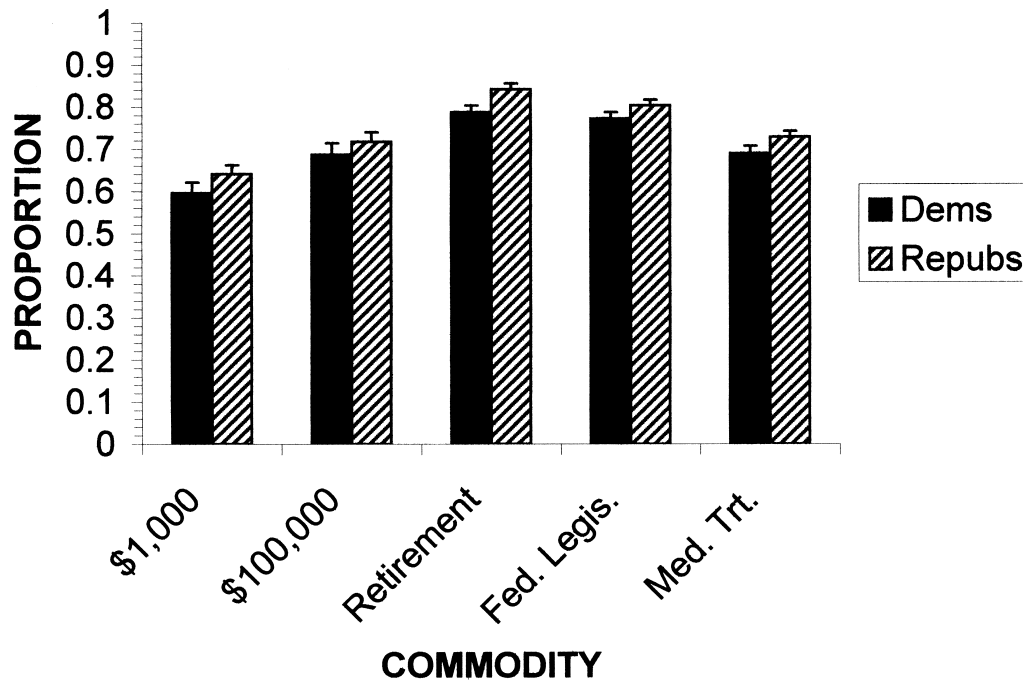

Figure 1. Presented is the area under the curve for the mean of all participants for each commodity. The error bars represent one standard error of the mean across participants for that particular commodity.

ing of regular church attendance were used as covariates. The main effect of political party was significant, $F(1, 259) = 4.37$, $p = .037$, $\eta^2 = .017$, indicating that Democrats discounted the commodities to a greater extent than did Republicans. The main effect of commodity was also significant, $F(4, 1036) =$

3.33, $p = .010$, $\eta^2 = .013$, indicating that rates of discounting differed across the different commodities. However, the interaction between political party and commodity was not significant (i.e., $p < .05$), $F < 1$, $\eta^2 = .001$. The lack of a significant interaction indicates that the pattern of discounting across the different commodities did not differ as a function of political party affiliation.[3]

In terms of the covariates, none significantly interacted with political party affiliation. However, the effect of gender was significant, $F(1, 259) = 4.73$, $p = .030$, $\eta^2 = .018$, and the effect of regular church attendance approached significance, $F(1, 259) = 3.44$, $p = .065$, $\eta^2 = .013$. The measures of gender, $F(4, 1036) = 8.68$, $p < .001$, $\eta^2 = .032$, and ethnicity, $F(4, 1036) = 2.80$, $p = .025$, $\eta^2 = .011$, produced significant interactions with the measure of commodity.

Discussion

The present study attempted to determine whether rates of delay discounting would differ across commodities as a function of membership in one of the two major political parties in the United States. The results suggest that such a difference exists. Across five commodities, Democrats displayed greater rates of delay discounting than Republicans. However, members of the different parties displayed similar changes in their rates of delay discounting across the five commodities.

The finding that Democrats displayed greater rates of delay discounting than Republicans can be interpreted several different ways. One is in terms of impulsiveness and self control. That is, Democrats demonstrated a consistent tendency to accept a lesser amount or percentage of a particular commodity immediately rather than waiting for the full amount or percentage relative to their Republican counterparts. This finding could be framed as Democrats being more willing than Republicans to make things better as soon as possible. Likewise, it

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[3] The present analysis was limited to Democrats vs. Republicans. However, it is worth noting that had Independents been included in the analysis, the same outcome would have been observed (i.e., significantly greater discounting by Democrats than Republicans). In that analysis, the discounting rates of Democrats would have been significantly greater than that of Independents, with no significant difference between the discounting rates of Republicans and Independents. The present analyses excluded Independents for two reasons. The first was practical. Only 50 participants identified themselves as Independents, which potentially posed problems for drawing statistical conclusions. The second was theoretical. By identifying themselves as either a Democrat or Republican, participants were providing a behavioral indicator that they, at least in part, subscribed to the platform presented by that particular party. The same could not be said for individuals who identified themselves as Independents.

could be interpreted as Republicans being more willing than Democrats to endure a delay without any progress so as to make things ever better in the future.

The second potential interpretation is one of value, with Democrats valuing the five tested commodities to a lesser degree than Republicans. Given the results reported by Sheldon and Nichols (2009), this interpretation would appear to make sense for several of the commodities (i.e., $1,000, $100,000, & potentially retirement income). However, why Democrats would place less value on Federal legislation or their own medical treatment is not as clear.

Regardless of the interpretation of the results, it is important to note that the significant difference in discounting observed between Democrats and Republicans was observed while controlling for other variables that might affect rates of discounting. For instance, research from our laboratory has demonstrated that rates of discounting monetary outcomes vary as a function of regular church attendance (Weatherly & Terrell, submitted a). Likewise, gender differences may exist in the discounting of some commodities (Weatherly & Terrell, submitted b). However, the difference in discounting observed between Democrats and Republicans in the present study was independent of these factors.

Perhaps just as important as the finding that Democrats displayed more delay discounting than Republicans was the failure to find a significant interaction between political party affiliation and discounting of the different commodities. The failure to find such an interaction indicates that, although members of the different political parties discount particular commodities at different rates, they do not differ in how those commodities are discounted relative to one another. Members of both parties discounted $1,000 more than any other commodity. They discounted their retirement income less than any other commodity. Thus, members of the different parties appear to see the same "big picture," but differ in how they discount individual commodities within that picture.

Before wide generalizations are made from the current results, it should be noted that the present procedure suffered from a number of limitations. The results were obtained from a group of young college students attending a public university in the upper Midwest of the United States. Thus, it is possible that different results would have observed had we used a non-college sample, a greater age range of participants, and/or a sample from a different region of the country. It is also the case that the present study tested only a handful of different commodities. It is quite possible that had other or additional commodities been tested, Republicans would have displayed greater rates of discounting than Democrats. Perhaps most importantly, despite finding a significant difference in rates of discounting between Democrats and Republicans, the effect size was small (i.e., $\eta^2 = .017$; Cohen, 1988). Thus, although the difference between the

political parties was unlikely to have occurred by chance, the proportion of the variance accounted for by political party was not large, indicating that other, potentially more important factors, may determine how individuals discount the five commodities tested here.

It is also the case that the present study did not ask participants about their underlying political philosophies (e.g., liberal, conservative). Because the correlation between being a Democrat and being liberal, or being a Republican and being conservative, is not a perfect one, the present results cannot address whether liberals and conservatives differ in how they delay discount these (or other) commodities. Given the present results, one might predict that such an outcome would be observed. However, future research will be required before that conclusion can be accepted.

It could also be argued that the present results were influenced by how the questions were framed. For instance, previous research (Weatherly, Derenne, & Terrell, 2010) has shown that rates of discounting can differ as a function of the context of the question, not just by the commodity. Specifically, Weatherly et al. demonstrated that college students discounted money they had won to a greater degree than the same amount of money that they were owed. This finding is potentially intriguing in relation to the present results because one cannot assume that the present difference in rates of delay discounting would have been observed had the questions been framed differently. In fact, researchers and politicians are often interested in how issues can be framed so that members of the different parties can place similar values on them. The study of delay discounting may represent an avenue for doing so. Although the present results showed that Democrats and Republican respondents discounted the present commodities differently, future research might explore how the framing of the same commodities might eliminate this difference. For example, discounting rates may differ greatly between members of different for a particular issue/commodity depending on how it is framed (e.g., health-care reform vs. government-run health care), but those differences may decrease or even disappear when the issue is framed more neutrally (e.g., improved health care coverage). Such an outcome is speculative, but if such a neutral context could be found, a path for bipartisan agreement on that particular issue/commodity may have been discovered.

One last potential criticism of the present study is that its pseudo-independent variable was a subject or trait variable. That is, it is not clear what contingencies might differ between Democrats and Republicans to produce the present difference in delay discounting. With that said, although the study of delay discounting is firmly rooted in behavioral psychology, there is debate as to how much discounting is influenced by state versus trait variables (see Odum &

Baumann, 2010, for a discussion). Further, as noted above, identifying oneself as a member of a political party is itself an operant, which suggests that political-party affiliation could be considered a state, rather than a trait, variable. As with the correlation between rates of discounting and behavioral disorders (e.g., pathological gambling; Dixon et al., 2003), political-party affiliation may be linked to how individuals discount delayed consequences. If so, altering how individuals discount such outcomes may influence their political views. Fortunately, the existing literature may provide some advice for how such an outcome may be accomplished. The magnitude effect, for instance, would lead one to predict that increasing public awareness of a particular issue would change how people discount that issue if its subjective value has been increased as a result. Those raising public awareness therefore might wish to concentrate on enhancing the function of the issue (e.g., what you get if health-care policies are addressed) rather than simple knowledge of its existence (e.g., health care is a problem in the United States). For individuals who value such a pursuit, this possibility may have great value.

References

Chapman, G.B. (1996). Temporal discounting and utility for health and money. *Journal of Experimental Psychology: Learning, Memory, & Cognition, 22*, 771-791. http://dx.doi.org/10.1037/0278-7393.22.3.771

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, N.J.: Erlbaum.

Dixon, M.R., Marley, J., & Jacobs, E.A. (2003). Delay discounting by pathological gamblers. *Journal of Applied Behavior Analysis, 36*, 449-458. http://dx.doi.org/10.1901/jaba.2003.36-449

Garst, J., & Bodenhausen, G.V. (1996). 'Family values' and political persuasion: Impact of kin-related rhetoric on reactions to political campaigns. *Journal of Applied Social Psychology, 26,* 1119-1137. http://dx.doi.org/10.1111/j.1559-1816.1996.tb02288.x

Hardisty, D.J., & Weber, E.U. (2009). Discounting future green: Money versus the environment. *Journal of Experimental Psychology: General, 138*, 329-340. http://dx.doi.org/10.1037/a0016433

Iyengar, S., & Hahn, K.S. (2009). Red media, blue media: Evidence of ideological selectivity in media use. *Journal of Communication, 59*, 19-39.

Logue, A.W. (1995). *Self-control: Waiting until tomorrow for what you want today*. Upper Saddle River, NJ: Prentice Hall.

Madden, G.J., & Bickel, W.K. (Eds.) (2010). *Impulsivity: The behavioral and neurological science of discounting*. Washington, D.C.: American Psychological Association.

Mazur, J.E. (1987). An adjusting procedure for studying delayed reinforcement. In M.L. Commons, J.E. Mazur, J.A. Nevin, & H. Rachlin (Eds.), *Quantitative analyses of behavior: Vol. 5. The effect of delay and intervening events on reinforcement value* (p. 55-73). Hillsdale, NJ: Erlbaum.

Myerson, J., Green, L., & Warusawitharana, M. (2001). Area under the curve as measure of discounting. *Journal of the Experimental Analysis of Behavior, 76*, 235-243. http://dx.doi.org/10.1901/jeab.2001.76-235

Mischel, W., Shoda, Y., & Rodriguez, M.L. (1989). Delay of gratification in children. *Science, 244*, 933-938. http://dx.doi.org/10.1126/science.2658056

Odum, A.L., & Baumann, A.A.L. (2010). Delay discounting: State and trait variable. In G.J. Madden & W.K. Bickel (Eds.), *Impulsivity: The behavioral and neurological science of discounting* (p. 39-65). Washington D.C.: American Psychological Association.

Sheldon, K.M., & Nichols, C.P. (2009). Comparing democrats and republicans on intrinsic and extrinsic values. *Journal of Applied Social Psychology, 39,* 589-623. http://dx.doi.org/10.1111/j.1559-1816.2009.00452.x

Smith, C.L., & Hantula, D.A. (2008). Methodological considerations in the study of delay discounting in intertemporal choice: A comparison of tasks and modes. *Behavior Research Methods, 40*, 940-953. http://dx.doi.org/10.3758/BRM.40.4.940

Weatherly, J.N., Derenne, A., & Terrell, H.K. (2010). College students discount money "won" more than money "owed." *The Psychological Record, 60*, 463-472.

Weatherly, J.N., Derenne, A., & Terrell, H.K. (in press b). Testing the reliability of delay discounting of ten commodities using the fill-in-the-blank method. *The Psychological Record*.

Weatherly, J.N., & Terrell, H.K. (a). *Differences in delay discounting of some commodities as a function of church attendance*. Manuscript submitted for publication.

Weatherly, J.N., & Terrell, H.K. (b). *Testing for gender differences in delay discounting of different commodities using a college sample*. Manuscript submitted for publication.

Weatherly, J.N., Terrell, H.K., & Derenne, A. (2010). Delay discounting of different commodities. *Journal of General Psychology, 137*, 273-286. http://dx.doi.org/10.1080/00221309.2010.484449

Appendix

X times = 1 week, 2 weeks, 1 month, 3 months, 6 months, 1 year, 5 years, & 10 years

Owes You $1,000
If someone owed you $1,000 and was going to pay you that amount in *X time*, what is the smallest amount of money you would accept today rather than having to wait *X time*?

Owes You $100,000
If someone owed you $100,000 and was going to pay you that amount in *X time*, what is the smallest amount of money you would accept today rather than having to wait *X time*?

Retirement
Your financial advisor informs you that you could retire at a wage of $100,000 per year but that you need to work for *X time* before that is possible. What is the smallest annual amount of money you would accept today rather than having to work *X time*?

Federal Education Legislation

Suppose the Federal Government is attempting to pass legislation that will reform the American educational system. Your senators tell you that it will take them *X time* to craft the perfect policy, but that they can pass a less-than-perfect one immediately. What percentage of perfect (i.e., 100%) would you find acceptable to get the legislation passed immediately rather than waiting for *X time* for the perfect policy?

Medical Treatment
Suppose you were suffering from a serious disease and your physician informed you that you would need to wait *X time* before getting a treatment that was 100% successful. However, you could immediately begin a different treatment that has a lesser chance of success. What is the minimum percentage of success that the different treatment could have for you to choose it?

* The identical questions were also used in Weatherly, Terrell, & Derenne (2010).