

Daniel Acland

Poverty, Irrationality, and the Value of Cash Transfers

Abstract: It has been demonstrated that irrationality reduces the efficiency of individuals' allocations, as measured by their "true" or rational preferences. There is also evidence that poverty increases irrationality of different sorts. As a result, the net benefit to society of a cash transfer from taxpayers to welfare recipients may not be zero. The fact that the transfer will be allocated less efficiently by the recipients than by the taxpayers will reduce the value of the transfer, while if the transfer increases recipients' rationality, it will increase the efficiency of the allocation of their pre-transfer budgets, thus increasing the value of the transfer. The net effect on society will be positive or negative, depending in large part on the degree to which the transfer increases rationality. I model these effects in the context of present-biased preferences and explore the effect of irrationality, income, and the size of transfer on the value of transfers. I conclude that under a plausible range of conditions, transfers can generate a substantial positive net benefit. I also model the choices of a fully rational paternalist and find little support for paternalistic in-kind transfers.

Keywords: Behavioral Economics; Cash transfers; Irrationality; Poverty

1 Introduction

It is generally accepted in benefit-cost analysis that, except for the effect of income disparities, transferring a dollar from one person to another in a non-distortionary way generates neither a cost nor a benefit to society as a whole (Boardman *et al.*, 2018; Hendren & Sprung-Keyser, 2020). If the former is wealthier than the latter, we might think that welfare has been increased because of the widely held belief that a dollar is more valuable to a poor person than to a rich person but ignoring that, shuffling dollars around doesn't affect social surplus.¹ But behavioral economics gives us reason to doubt this conclusion. There are conditions under which, because

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1 For the purpose of this paper, I am going to abstract away from the issue of money being worth more to the poor than to the rich. In other words, I am going to assume that the marginal utility of wealth is the same regardless of wealth level. Ideally, diminishing marginal utility of wealth and irrationality should be adjusted for simultaneously but that is beyond the scope of this paper.

of the effect of irrationality² on decision-making, a straight cash transfer reduces social surplus, and conditions under which, because of the effect of income on rationality, it increases social surplus.³ If these conditions are met in the real world, then when conducting benefit-cost analysis of cash transfers, we need to include the decrease or increase in net benefit to society caused by these effects. It is the purpose of this paper to explain why this is necessary and to propose a methodology for estimating the size of the loss or gain. Consider the following two cases.

First, suppose that individuals who are not in poverty are more rational than those who are. There is evidence to support this possibility, which I will review later. Behavioral economists have shown that if individuals are irrational, in the sense of having some kind of biased preferences, making irrational probability inferences, or suffering from some other kinds of decision-making biases or errors, their economic choices will generate less welfare for them, according to their rational preferences, than if they were rational. If we imagine a taxpayer and a recipient with identical rational, or “true” preferences but different levels of irrationality, a dollar spent by the taxpayer will generate more welfare than a dollar spent by the recipient because the recipient, being more irrational, will “misallocate it” more. In this case, a dollar taken from a taxpayer will be worth more than a dollar given to a recipient, and a cash transfer will have negative net benefits, which should be estimated and included in benefit-cost analysis.

Next, there is also evidence to suggest that lifting people out of poverty can increase their rationality. Suppose a transfer raises the recipient’s income enough that their rationality improves (while not lowering the taxpayer’s income enough to lower their rationality). This has two effects. First, it causes the recipient to allocate the transfer more efficiently than they otherwise would. Second, it causes them to re-allocate their pre-transfer budget more efficiently. Whether the transfer will generate positive net benefits will depend on how much the transfer increases rationality. Suppose the transfer brings the recipient to the same level of rationality as the taxpayer. In that case, the value of goods purchased by the transfer itself will be the same to the recipient as to the taxpayer, but the value of the recipient’s preexisting income will be increased relative to how it was being allocated before the transfer, so the transfer will unambiguously increase social surplus, by an amount that, again, should be estimated and included in benefit-cost analysis. Meanwhile, if the transfer increases the recipient’s rationality somewhat but not to the level of the taxpayer, the net effect of the transfer on social surplus will be ambiguous.

2 I am using the term irrationality in the formal sense in which it is used in Behavioral Economics, a failure of one of the three primary rationality assumptions of standard Economics: transitivity, rational expectations, and unbounded rationality. I make this definition more precise in Section 2.

3 I am also ignoring the so-called leaky bucket effect, which is to say the loss of social surplus that results from tax distortions and the cost of administering transfer programs. I briefly address tax distortions later.

Beyond observing these effects, and highlighting the need for some kind of adjustment to benefit-cost analysis, the main goal of this paper is to take some preliminary steps toward a practicable methodology for estimating what we might call a “rationality multiplier,” which might be above or below zero, depending on factors such as the size of the transfer, the degree of pre-transfer poverty, and the degree to which poverty affects rationality. In addition, I explore the possibility that a paternalistic policy maker might be able to make a recipient better off through an in-kind transfer than they would make themselves through their allocation of a cash transfer. Thus, the paper contributes to the literature on tax and transfer policy, as well as the literature on in-kind versus cash transfers, and the literature on paternalism. The remainder of the paper proceeds as follows. In Section 2 I review the evidence of the relationship between income and rationality. In Section 3 I present a graphic model of the effect of irrationality on transfers, and formally define the multiplier I propose. In Section 4 I work through a model of a good that is subject to present-biased preferences, use rough approximations of its parameters to estimate the multiplier in a real-world setting, and then explore how the multiplier changes with the various parameters of the model. In Section 5 I consider the case for paternalistic in-kind transfers. Section 6 concludes.

2 Evidence on poverty and decision-making

The term “irrationality” is controversial outside the field of Economics. I am using the term in a relatively technical sense, to mean a failure of one of the following assumptions of standard economics. (i) Rational preferences: preferences are complete and transitive, which implies no preference reversals. (ii) Rational expectations: beliefs about the distributions of probabilities are correct (which includes correct Bayesian inference). (iii) Unbounded rationality: individuals are able to process all available information and implications of their choices (particularly in the contexts of uncertainty and strategic decision-making, but also decisions involving multiple dimensions of cost and benefit). Behavioral economists have documented numerous failures of these assumptions in numerous domains of economic decision-making.⁴ There is a growing body of evidence that some of the phenomena that have been studied may be exacerbated by poverty, and alleviated by getting out of poverty, particularly in the domain of intertemporal decision-making, but also in domains in which bounded rationality obtains, and possibly choice under uncertainty, among others. That said, I want to emphasize that I do not claim that the evidence is

⁴ For a review of empirical literature categorized roughly according to the three components of rationality I’ve outlined, see DellaVigna (2009).

unassailable. Rather, I feel that there is enough evidence to warrant an investigation into the implications for estimating the net benefits of transfers. Implementation of the approach I am suggesting should proceed with caution.

One piece of evidence comes from Choi *et al.* (2014) who used a simple experimental budget-allocation task to identify consistency (i.e., transitivity) of preferences using the Critical Cost Efficiency Index (CCEI), the fraction by which budgets would need to be changed for all choices to be consistent with transitivity. Individuals with monthly incomes below \$2,500 had, on average, a CCEI 3.3 percentage points below those with incomes above \$5,000, making them “less rational.”

Additional evidence comes from the study of time preference, and in particular, present bias, the phenomenon of placing a greater weight on outcomes in the immediate present than on outcomes at any point in the future. Present bias causes failures of transitivity, as evidenced by preference reversals. When two outcomes are both in the future, an individual will make one choice. When the first of the two outcomes enters the “present,” the individual may make a different choice.

There is evidence of a correlation between income and time preference. Using the Panel Study of Income Dynamics from 1975 to 1982, Lawrance (1991) estimated discount rates for households with above- and below-median labor income of 4% and 21%, respectively. Carvalho (2010) estimated discount factors among recipients of cash transfers in Mexico of 0.08–0.7, considerably lower than those estimated among wealthier populations. Yesuf and Bluffstone (2008) elicited discount rates among farmers in Ethiopia between 43% and 106%. The discount rate was found to be decreasing in various measures of wealth. Pender (1996) conducted a similar study in rural India using rice rather than money. The range of discount rates was 37%–119%. Wealth was found to be negatively correlated with discount rate.

Tanaka *et al.* (2010) used two variables, rainfall, and a dummy for whether the head of household was working, as instrumental variables for income in a sample of rural Vietnamese households, and found a causal link between income and time preference. Income had a negative effect on the discount rate but there was no statistically significant effect on the present-bias parameter in a quasilinear model of present bias.

These studies do not provide explicit evidence of a relationship between poverty and present bias *per se*, but the discount rates in these studies seem incompatible with exponential discounting. A discount rate of 100% implies that when trading off outcomes in 10 years against outcomes in 20 years, the latter would be weighted approximately three orders of magnitude less than the former. This seems implausible. It seems more likely that individuals in the studies exhibited present bias, and that the degree of present bias was correlated with income or wealth.

The above studies could be explained by credit constraints. Epper (2015) demonstrated theoretically that if individuals are credit constrained and expect a future

increase in income, they will prefer money now, when their marginal utility of consumption is relatively high, to money later, when they expect it to be lower. If the degree of credit constraint is negatively correlated with income, the results above would be explained. Carvalho *et al.* (2016) found support for this explanation by comparing a randomly selected pool of low-income individuals surveyed just before payday to others surveyed just after. They found that what looks like present bias is correlated with income when trade-offs are monetary, but not for real-effort tradeoffs, but that the former is only true for individuals who are credit constrained, suggesting that the evidence of a link between income and present bias may be spurious.⁵ Next, I present evidence that rules out credit constraints.

Haushofer and Fehr (2019) found a causal relationship between income shocks and time preference, in a lab setting where “income” and “income shocks” were exogenously induced. The word “income” is in quotes because it consisted of very small payments. Also, we might doubt the external validity of the study since it did not include individuals in poverty. However, the findings on income *shocks* might have greater external validity. The authors find that negative income shocks increase present-bias while positive income shocks decrease exponential discounting.

Two additional sources of evidence take a two-stage approach, first linking poverty to certain psychological states or phenomena, and then linking those to time preference. The first involves the effect of income on affect and stress. The second involves the phenomenon of “scarcity.” There is a large literature linking poverty and income shocks to mental health, stress, and levels of the stress hormone, cortisol. Much of this literature is summarized in Haushofer and Fehr (2014). Income (or wealth) is negatively correlated with depression and anxiety, self-reported mental health, and cortisol levels. Cash transfers increase happiness and life satisfaction and reduce stress, depression, and cortisol. Positive shocks decrease mental-health hospitalization and increase self-reported mental health. Negative shocks increase self-reported stress, cortisol, and family mental health problems.

Next, these states and phenomena are linked to time preference. Lerner *et al.* (2013) induced sadness in subjects using a sad 3-minute video clip and a writing task on a sad experience and elicited discount factors of 0.28 for control subjects and 0.21 for treated subjects. Both are low enough to suggest present bias. Ifcher and Zargamee (2011) induced positive affect with a short video clip and found that positive affect increased willingness to accept immediate payment for a delayed reward by between 4% and 30% of the future payment, suggesting a decrease in present bias.⁶ Finally, Cornelisse *et al.* (2013) injected subjects with hydrocortisone and had them

⁵ It is possible, of course, that all of their subjects exhibit stronger present bias than those with significantly higher income.

⁶ It should be noted that an attempt to replicate these results failed (Camerer *et al.*, 2016).

make smaller/sooner vs larger/later choices. Treated subjects were nine percentage points less likely to wait for the larger payment than control.

The second two-stage approach provides, in my view, the most persuasive evidence, and comes from the literature on the effect of scarcity on decision-making. This literature is reviewed in the book *Scarcity* by Mullainathan and Shafir (2013). The phenomenon of not having enough of some resource to fulfill one's perceived basic needs has two distinct psychological effects. The first is a reduction in cognitive capacity, which affects discounting through an increase in myopia, the tendency to ignore the future impacts of current decisions. The second effect of scarcity is a reduction in self-control, including the ability to resist temptation or the ability to endure short-term costs for long-term gains.

Mani *et al.* (2013) – on which Mullainathan and Shafir are coauthors – conducted two studies. In the first, subjects were asked to make a hypothetical decision about whether to have their car repaired or instead to forgo the repair at the cost of a more expensive repair later. One group was given a low-cost repair scenario, the other, high cost. Both groups were then asked to complete a pair of simple tests of cognitive capacity. High-income and low-income subjects performed similarly on the tasks when the repair was cheap, but low-income subjects performed substantially worse on both tasks when the repair was costly, which the authors' assumed triggered scarcity. In the second study, sugarcane farmers in rural India were studied before and after harvest, which significantly affected their financial resources and their ability to meet basic financial needs. They found lower cognitive capacity and self-control before the harvest. The authors were able to rule out pre- and post-harvest differences in physical exertion, anxiety about crop yields, hunger, and stress. Since reductions in cognitive capacity increase myopia, and reductions in self-control reduce ability to resist temptation, the two main components of present bias, it seems not unreasonable to interpret the findings as evidence of a link between poverty or income shocks and present bias.

Shah *et al.* (2012) measured the effect of scarcity-induced myopia on borrowing using a pool of subjects asked to play computer games in a lab. Scarcity was induced for a randomly selected group by limiting the number of opportunities to succeed. Random subgroups were allowed to "borrow," by choosing to increase the number of opportunities in the current round, at the expense of having a smaller number of opportunities in the subsequent round. The scarcity group borrowed more than the non-scarcity group, and achieved lower cumulative success than a third group that was subjected to scarcity but not allowed to borrow, suggesting that scarcity caused them to "overborrow," in the sense that they made themselves worse off than if scarcity had not affected their time preference. The authors attribute this to scarcity-induced myopia.

It is important to note that the research on scarcity also suggests that there are domains in which poverty *increases* rationality and the quality of decision-making.

Mullainathan and Shafir (2013) find improved decision-making and cognitive performance with respect to tasks and decisions directly related to the domain of scarcity. For example, they show that among the non-poor, willingness to expend time to save a fixed amount of money is correlated with the cost of the item involved, which violates rationality. Low-income individuals typically don't do that, presumably because they are more focused on the monetary value of time. Similarly, while Shah *et al.* (2012) find that players borrow more under conditions of scarcity, and perform worse in future rounds as a result, they also find that players under scarcity who are not allowed to borrow perform better than those not subject to scarcity, again presumably because they are more focused on the task at hand. Thus, there may be specific domains in which the implications for welfare economics would be the opposite of what I present, though my approach to determining the appropriate rationality multiplier would still apply.

Though the evidence of an effect of poverty on rationality is strongest in the case of present bias, there may be reason to suspect a relationship exists in other decision-making domains. For one thing, if scarcity causes a reduction in cognitive capacity, it seems likely that this would cause an increase in failures of the assumption of unbounded rationality, which economists make when decisions require attention to multiple dimensions of cost and benefit, consideration of complex uncertain situations, or strategic interaction. Also, there is evidence that could be interpreted as suggesting that poverty might increase irrationality in the case of risk preference. A correlation between income and risk preference has been established through studies similar to those that established the correlation in the case of time preference.⁷ The effect of affect and stress on risk preference has also been well established.⁸ Though explaining a decrease in risk tolerance does not require recourse to irrationality, there are plausible channels through which the effect could be caused by irrationality. One is negativity bias, giving greater weight to negative outcomes in risky decisions (Cacioppo *et al.*, 2014), which may be caused by availability bias, recalling, and emphasizing phenomena that are particularly salient or come readily to mind (Tversky & Kahneman, 1973). If negativity bias is correlated with income, this could explain the correlation between income and risk tolerance. This might be the case if availability bias is exacerbated by reduced cognitive capacity brought on by scarcity, which seems plausible.

Or, individuals may mispredict the size and persistence of gain/loss utility. Typically, individuals place greater weight on a loss of a given size than on the same-sized gain (Kahneman & Tversky, 2013), resulting in reduced risk tolerance when some outcomes are in the domain of losses. Additionally, individuals

⁷ For example: Dohmen *et al.* (2011), Guiso and Paiella (2008), Tanaka *et al.* (2010).

⁸ For example: Porcelli and Delgado (2009), Clark *et al.* (2012), Cingl and Cahlikova (2013), Guiso *et al.* (2018), Kandasamy *et al.* (2014).

typically mispredict the size and duration of future impacts such as gain/loss utility, the so-called impact bias (Gilbert *et al.*, 2002). If impact bias inflates the effect of loss aversion in decisions under uncertainty, and is correlated with income, this could explain the correlation between income and risk tolerance. Given that impact bias involves assessments with respect to the future, increased myopia caused by scarcity might explain the observed results, and again, this seems plausible.

To summarize, I feel there is fairly compelling evidence of a relationship between poverty and present bias, and evidence to suggest there may be other domains of irrationality that are affected by poverty. On the one hand, this may seem like a relatively unstable foundation for a fundamental modification to welfare economics, and I confess that the evidence is not unassailable at this point in time. However, there are two reasons why I feel my contribution is nonetheless timely. First, even if the only effect of poverty on irrationality was in the domain of present bias, the welfare implications are likely to be quite large. Present bias is implicated in decisions that affect health, education, and consumer finance, including, in particular, retirement savings and also consumption that necessitate expensive short-term credit such as payday loans. These are decision-making domains that represent a non-trivial fraction of human welfare. Second, while the relationship between poverty and rationality has certainly not been established beyond doubt, I believe the evidence is strong enough to warrant a preliminary investigation into the effect on the benefit-cost analysis of transfer programs. If the relationship is proved beyond doubt, I feel there will be value in having begun to address the issue at this time.

3 The effect of irrationality on the value of a dollar

To make progress in understanding the value to society of cash transfers in the presence of irrationality, we have to adopt a particular normative position. There is a common but not universally accepted idea among behavioral economists that irrational individuals have essentially two sets of preferences, their revealed preferences, those that we would induce from the choices they make under irrationality, and their “true” preferences, those that their choices would reveal in the absence of any irrationality. We sometimes speak in terms of rational versus irrational preferences. In order to engage in any kind of normative analysis, we have to decide which of these sets of preference has standing in benefit-cost analysis. My argument hinges on the position that the true, or rational preferences have standing.⁹ A convenient way to conceptualize this is that the individual has two “selves,” rational and irrational, and

⁹ See Thaler and Sunstein (2003) and Camerer *et al.* (2003). This is exactly the position taken by David Weimer (2017) in his investigation of how to “adjust” willingness to pay estimates to account for

that the irrational self succeeds in implementing choices that lower the well-being of the rational self, relative to the choices the rational self would have implemented.¹⁰

3.1 Effect 1: Irrationality makes a dollar worth less than a dollar

Consider a two-good model with goods X and Y , both normal, where irrationality causes an individual to over-consume X and under-consume Y , and consider a cash transfer to the individual, T . Assume also that the transfer does not affect the rationality of the individual's preferences. Figure 1 depicts the effect of the transfer. The individual's rational indifference curves are in blue and irrational in red. Points A and B are the individual's pre- and post-transfer optimal bundles under rational preferences. If prices are normalized to one, the size of the transfer is the distance between the vertical intercepts of the pre- and post-transfer budget constraints. Using M to denote the individual's budget, $M_1 - M_0 = T$.

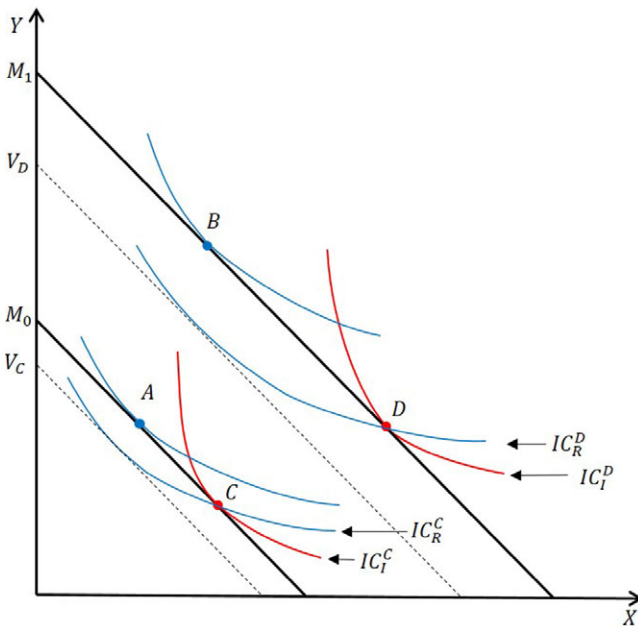


Figure 1 The effect of irrationality on the value of a dollar.

irrationality. Bernheim and Rangel (2009) offer a different approach to measuring welfare under irrationality, which I discuss in the conclusion.

¹⁰ See, for example, Kahneman (2011) and Thaler and Shefrin (1981).

The individual's actual pre- and post-transfer bundles will be determined by their irrational preferences. These are points C and D , and IC_I^C and IC_I^D are the irrational indifference curves they lie on. We need to know the dollar value to the rational self of the bundles that the irrational self chooses, and we do that using expenditure minimization: what is the smallest budget that, if allocated by the rational self, would give them the same level of utility as they get from the irrational bundle. The rational indifference curves that the irrational bundles lie on are IC_R^C and IC_R^D . The dotted lines represent the smallest budgets that would put the rational self onto each of those rational indifference curves, and the sizes of those budgets, V_C and V_D can be thought of as the dollar value to the rational self of the irrational self's pre- and post-transfer allocations. The difference between the two can be thought of as the dollar value generated by the transfer, and if we divide it by T , we get something we might call an adjuster, $a = \frac{V_D - V_C}{T} < 1$, the proportion of the dollar value of the transfer that the individual actually experiences. Now, there will be an adjuster for the recipient, a_{rec} , and another, larger adjuster for the (more rational) taxpayer, a_{tax} , and the difference between the two is the rationality multiplier I propose, $\mu = a_{rec} - a_{tax} < 0$. In a benefit-cost analysis, in addition to the transfer itself, we would include a cost to society of μT .

3.2 Effect 2: Becoming more rational makes a dollar worth more than a dollar

Now imagine that the transfer has the effect of raising the rationality of the recipient to the same level as the taxpayer (while not decreasing the rationality of the taxpayer¹¹). Figure 2 depicts this case. The individual will not only allocate the transfer more rationally but will reallocate their pre-transfer budget more rationally as well, leaving them closer to the fully rational post-transfer bundle, B . Now the difference between the dollar values of the pre- and post-transfer allocations is greater than the size of the transfer, whereas the size of that difference for the taxpayer has not changed, so we get $a_{rec} = \frac{V_D - V_C}{T} > 1$ and $\mu = a_{rec} - a_{tax} > 0$. In this case, μT is a benefit to society.

Finally, suppose the transfer increases the recipient's rationality but not to the same level as the taxpayer's. In this case the sign of the multiplier will be ambiguous. The fact that the recipient's rationality remains below that of the taxpayer pulls the multiplier down while the fact they are more rational than before pulls the multiplier up.

¹¹ Which is not implausible if we consider that the revenue necessary to fund the transfer will actually be raised from multiple taxpayers.

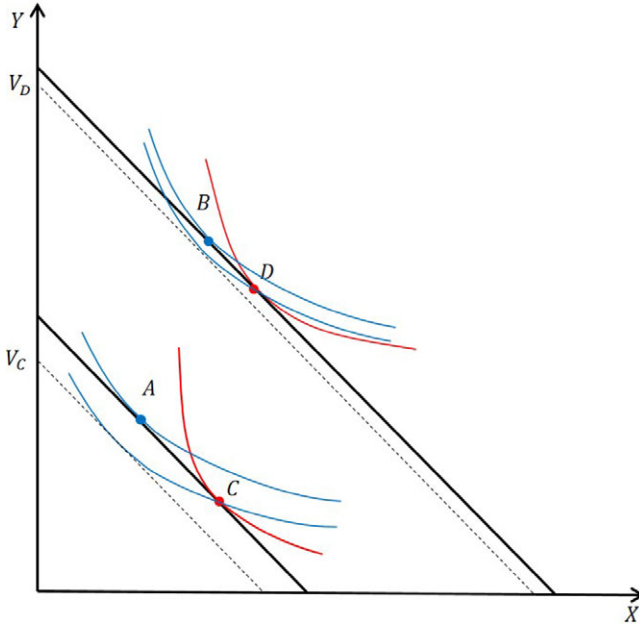


Figure 2 The effect of increasing rationality on the value of a dollar.

4 Adjustment in practice: an example

For these observations to be useful in practical terms it will be necessary to come up with some practicable way to estimate the value created or destroyed by any given transfer from any given representative taxpayer to any given representative recipient. One approach would be to predict the impacts of the transfer on recipients based on empirical studies, and monetize those impacts. If the estimated dollar value of the impacts is greater than the size of the transfer, the rationality multiplier is positive, and vice versa. Indeed, in their study of the net benefit of a variety of policies intended to benefit the poor, Hendren and Sprung-Keyser (2020) do just this, and find that an increase in AFDC benefits (Aid to Families with Dependent Children, a cash transfer) resulted in a positive net benefit to society. They provide no explanation of this anomalous result. It could be caused by an effect of the transfer on the rationality of recipients, but there are issues with this approach that make it impossible to identify the cause for the finding of non-zero net benefits.

The first problem is that in many cases the benefits measured will be too high. One reason is that many impacts will be monetized using the willingness to pay (WTP) of samples whose wealth distribution is higher than that of transfer recipients,

and their WTP thus higher. For example, the value of a statistical life (VSL) is increasing in income (Hammitt & Robinson, 2011). If a transfer reduces the risk of death (e.g., through increased spending on healthcare), standard practice would be to monetize that risk reduction using a value of VSL from a representative sample of the population. If the average income of the sample is greater than that of recipients, the VSL will be higher than it would be if estimated from a pool with income comparable to the recipients. Now, when we say that a dollar of transfer is worth one dollar to the recipient, what we mean is that she would be willing to pay one dollar for whatever benefits she receives from the goods to which she allocates the transfer. But when we use a population VSL to estimate the recipient's WTP for the risk reduction benefits she receives from the goods to which she allocates the transfer, the estimate will be too high because it is based on the (higher) WTP of the relatively higher income sample. The same will be true for health benefits monetized by the value of a life year (VLY), and impacts monetized using contingent valuation. Thus, estimates of the benefits generated by a transfer will be higher than if they were monetized using the WTP of individuals with income comparable to the recipients.

Two other reasons the estimated benefits of the transfer to recipients are likely to be too high are related to the fact that when we say that the amount of utility generated by a transfer is worth the dollar value of the utility generated by the goods to which the transfer is allocated, what we are referring to is the *discounted, expected* utility, as of the time the transfer is allocated. Because estimates of the value of future benefits and risky gambles often do not correctly account for discounting and risk aversion, estimates of the value generated by the goods to which the transfer is allocated will be too high.

First, consider future benefits. Estimates of their net present value will typically be computed using discount rates in the range of 3%–7%, whereas individuals in the real world often discount at substantially higher rates, and particularly those in poverty. Thus, a recipient's WTP for such impacts may be less than the net present value computed by analysts, meaning that estimates of the dollar value of the future benefits generated by the transfer will be higher than the true dollar value to the recipient as of the time of the transfer.

Second, many future benefits are actually the result of risky gambles, for example, the returns to education. The value of education is typically captured using average increased lifetime earnings, which is the expected *value* of the gamble. But an individual's *ex ante* WTP for a gamble should be based on its expected *utility*, not its expected value, and due to risk aversion, this is typically lower than the utility of the expected value. In other words, because of risk aversion, WTP for a gamble is less than the expected value of the gamble. And in addition, as we have seen, poverty decreases risk tolerance. Thus, estimates of the dollar value to the recipient of risky benefits generated by the transfer will be higher than the true dollar value to the recipient as of the time of the transfer.

Finally, there are factors other than irrationality that could result in the value of a transfer being more or less than zero, such as income constraints and the direct health and education impact of poverty-induced stress. I comment on these factors in the conclusion. To address all of the above concerns with directly predicting and monetizing the net benefit of cash transfers, I propose what might seem like a more ambitious approach, based on formal models of preferences and irrationality. If the analyst had a rich enough model of both rational and irrational preferences, and good information about how the parameters of the model are affected by income, the appropriate rationality multiplier could be estimated. The analyst would first use utility maximization to compute the irrational pre- and post-transfer bundles for taxpayers and recipients, and then use expenditure minimization to determine the dollar value to the rational selves of each bundle, and hence the rationality multiplier. In other words, they would compute bundles C and D from Figure 1 for both the recipient and the taxpayer, and the respective dollar values of those bundles, V_C and V_D , and then use those values to compute the adjusters for each individual, a_{rec} and a_{tax} , and then compute μ , the rationality multiplier necessary to compute the value created or destroyed by the transfer.

This might seem infeasible, but perhaps we should not consider it completely out of reach. There are already impacts we value using actual utility models, with empirically estimated parameters. Quality adjusted life years (QALYs) are an example. QALYs are a measure of utility, and the formula for computing them is a specific functional form of utility, one that requires numerous quite strong assumptions, and parameter estimates (the utility indexes). Also, the value of uncertain outcomes is sometimes estimated using specific analytical forms of the utility-of-wealth function in expected-utility theory, typically Constant Absolute Risk Aversion (CARA) or Constant Relative Risk Aversion (CRRA). These models of risk preference also require strong assumptions about how individuals make choices among risky alternatives. These examples may seem simpler and less ambitious than the endeavor currently under consideration, but they are, nonetheless, radical simplifications in their own right. So perhaps a “good enough” methodology can be developed on the basis of actual utility models.

4.1 Multiplier under present bias

To make a start on the project, I work out a simple example of present bias.¹² (I have also modeled deviations from standard risk preferences. The results are qualitatively

¹² The simple model I develop is in no way intended to constitute a proof of the effects I have identified. It is simply an attempt to make a start on a practicable methodology, in the context of one particular form of irrationality.

the same.) I begin with a model of present bias developed by Laibson (1997) and O'Donoghue and Rabin (1999). The idea captured by the model is that, in addition to the per-period discounting typically modeled using an exponential discounting function – using δ to denote the discount factor – individuals also discount all future periods relative to the present by some additional factor, denoted as β , thus leading the model to be referred to as the β, δ model. The basic model is very simple. It consists of a single modification to the standard exponential utility model. Individuals are modeled as making intertemporal decisions according to

$$U = u_0 + \beta \sum_{t=1}^T \delta^t u_t,$$

where U is intertemporal utility over time profiles of consumption, u_t is “instantaneous” utility, meaning the utility the individual experiences in period t from either consumption in period t or the effects at time t of consumption in prior periods, $\beta \in (0, 1]$, and $\delta \in (0, 1)$.

For $\beta = 1$, this becomes the standard exponential discounting model. For $\beta < 1$, preferences described by this utility function are irrational, in the sense that they violate transitivity, leading to preference reversals. The classic example is the reversal that involves choosing \$105 two periods in the future over \$100 one period in the future but also choosing \$100 now over \$105 one period in the future. The reversal is caused by the fact that the utility generated by the \$100 is suddenly inflated by $1/\beta$ when it “arrives” in the present. In terms of how the word “irrational” is used in common parlance, present-bias can lead individuals to forgo high-yield investments that would increase their “true,” or unbiased utility, due to either temptation to spend their money immediately, or myopia with respect to the future consequences of their actions, both of which are captured in the β term.¹³ It is generally agreed upon that if δ is estimated from observed choices, either real or hypothetical, using the standard exponential-discounting model, the values estimated are often implausibly low, and can only be explained by present bias.¹⁴

To apply this model to the estimation of rationality multipliers, I develop a simplified model with two goods: X , which has current benefits and future costs, and Y , which has only current benefits. A present-biased individual will overconsume X (because they do not adequately account for the future cost of current consumption) and under-consume Y (because the sum of expenditures on the two goods must be equal to the individual's income), in the sense that their consumption will not maximize their true utility function, defined by $\beta = 1$.

¹³ Findings of $\beta < 1$ in the literature are robust to issues of liquidity constraints and uncertainty about fulfillment of future payments.

¹⁴ See, for example Thaler (1991).

I normalize prices to 1 for simplicity, and assume (without loss of generality) no borrowing and $\delta = 1$. I define M_0 as the pre-transfer budget, T as the transfer, and $M_1 = M_0 + T$ as the post-transfer budget. Finally, I use Cobb-Douglas utility for the instantaneous utility function, and assume that the future cost of consumption of good X is linear in X , with a cost per unit of b . Thus, the individual chooses current consumption according to

$$U(X, Y) = X^\alpha Y^{1-\alpha} - \beta bX.$$

The first task is to compute the rationality multiplier when the transfer does not increase rationality. I begin by computing bundles C and D in Figure 1, the pre- and post-transfer bundles actually chosen by the irrational recipient.

$$C = (X_C, Y_C) = \underset{X, Y}{\operatorname{argmax}} X^\alpha Y^{1-\alpha} - \beta bX \quad \text{s.t.} \quad X + Y = M_0.$$

$$D = (X_D, Y_D) = \underset{X, Y}{\operatorname{argmax}} X^\alpha Y^{1-\alpha} - \beta bX \quad \text{s.t.} \quad X + Y = M_1.$$

The only difference in these expressions is the size of the budget. Having computed these bundles, the next step is to compute the dollar value to the rational self of each of these bundles. This is done using expenditure minimization, which gives us the minimum budget that would allow the rational self to achieve the same utility they get at each irrationally chosen bundle. These values are V_C and V_D respectively.

$$V_C = \min_{X, Y} X + Y \quad \text{s.t.} \quad X^\alpha Y^{1-\alpha} - bX = X_C^\alpha Y_C^{1-\alpha} - \beta bX_C,$$

$$V_D = \min_{X, Y} X + Y \quad \text{s.t.} \quad X^\alpha Y^{1-\alpha} - bX = X_D^\alpha Y_D^{1-\alpha} - \beta bX_D.$$

As explained in Section 3, the adjuster for the individual is computed as $a = \frac{V_D - V_C}{T}$. Adjusters are computed for recipients and taxpayers, a_{rec} and a_{tax} , respectively, and the multiplier is computed as $\mu = a_{rec} - a_{tax}$.

Next, what about the case of a transfer large enough to improve the rationality of the recipient? To incorporate this phenomenon I introduce an additional component of the model, which is the relationship between the size of the budget and the present-bias parameter, β . For simplicity, I assume the relationship is linear, between a threshold income at which the increase in rationality begins, \underline{M} , and a second threshold, \overline{M} , at which it is complete. I denote the present-bias parameter at and below \underline{M} as $\underline{\beta}$, and the present-bias parameter at and above \overline{M} as $\overline{\beta}$ (these could be thought of as the levels of irrationality under scarcity and non-scarcity, respectively). Thus, the relationship between β and income is

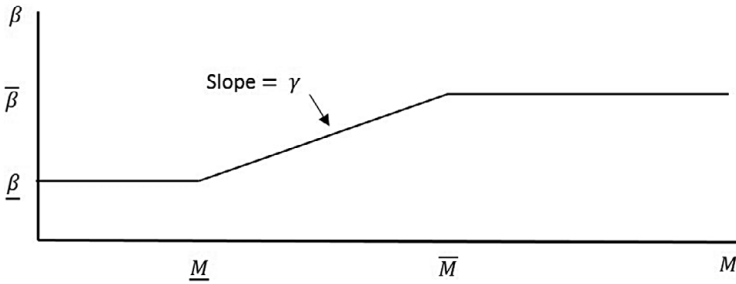


Figure 3 Beta as a function of income.

$$\beta(M) = \begin{cases} \underline{\beta} & \text{for } M \leq \underline{M} \\ \underline{\beta} + \gamma(M - \underline{M}) & \text{for } \underline{M} < M < \overline{M}, \\ \overline{\beta} & \text{for } M \geq \overline{M} \end{cases}$$

where $\gamma = \frac{\overline{\beta} - \underline{\beta}}{\overline{M} - \underline{M}}$.

This function is depicted in Figure 3. To compute the value of a transfer that increases rationality we have to compute V_C using $\beta(M_0)$ and V_D using $\beta(M_1)$. The resulting value of the transfer may be greater than or less than T , depending on the size of the transfer and how much it increases rationality. To recover the earlier model in which transfers do not increase rationality, we set $\overline{\beta} = \underline{\beta}$.

4.2 Results

To gain insight into what the multiplier might look like as a function of rationality, preferences, and the size of the transfer, I use computational optimization to compute μ under different values of $\underline{\beta}$, different initial income levels, and different sizes of transfer. Initially I set M_0 equal to approximately the poverty line for a single-person household, \$15,000, and begin by assuming $\underline{M} = M_0$. I set \overline{M} approximately equal to one estimate of “sufficiency” income for a single person, \$25,000. I assume $\overline{\beta} = 0.8$, which is in the range of estimates that have been found in empirical literature, and $\underline{\beta} = 0.5$, which is in the range of values implied by the literature reviewed above. As a starting place I assume $\alpha = 0.3$ and $b = 2$. I chose these preference parameters to roughly approximate the case of ultra-processed foods, which might be thought of as subject to present bias, and have been shown to have significant negative long-term health impacts.¹⁵ With these parameter values, the quantity of ultra-processed foods

¹⁵ Schnabel *et al.* (2019).

consumed in my model is approximately the same as for the average American, and the size of the long term health impact is equivalent to the assumption that a \$5,000 increase in consumption of ultra-processed food leads to a loss of approximately 0.02 QALYs, which seems not implausible.

For a transfer of \$8,100, roughly the annual sum of TANF and SNAP benefits for a single-person household, the taxpayer's adjuster is 0.990, while that for the recipient is 1.138, meaning that the rationality multiplier is 0.148 and the net benefit to society generated by the transfer is \$1,200. If the transfer had not increased the recipient's rationality, the recipient's adjuster would have been 0.897, representing considerably less efficient allocation than the taxpayer, and resulting in a loss of social surplus of \$753. Since the value generated by the transfer is the difference between the value gained as a result of allocating the pre-transfer budget more efficiently and the value lost as a result of inefficient allocation of the transfer, we can compute the former to be $1,200 + 753 = 1,953$. In other words, effect 1 destroyed \$753 worth of value, while effect 2 generated \$1,953.

A fully rational recipient's consumption of good X would have started at 778 and increased to 1,199. Due to irrationality, the recipient's actual pre-transfer consumption is 1,544, a 98% over-allocation, and the transfer increases consumption to 1,646, a 37% over-allocation. In other words, the transfer results in an actual post-transfer bundle, D , substantially closer in proportional terms to the optimal post-transfer bundle, B , than the actual pre-transfer bundle, C , was to the optimal pre-transfer bundle, A .

Using an estimate of the marginal excess tax burden from Boardman *et al.*, (2018), the deadweight loss caused by the taxation necessary to raise the funds for the transfer would be \$2,146, resulting in a net loss to society from the transfer program of \$946. The degree to which poverty depresses rationality affects the value generated by a transfer of any give size. Figure 4 shows the net benefit of the program as β increases from 0.1 to 0.8. As the degree to which poverty depresses rationality increases, so does the net value of the transfer program.

The program nets out positive for values of β below approximately 0.4. This might be considered an implausibly low range, but in light of the fact that there are multiple forms of irrationality that are affected by poverty, and multiple categories of goods that are affected by irrationality, the order of magnitude of net benefits in Figure 4 might be considered plausible.

An interesting question to ask is what happens to the multiplier as the transfer increases. Figure 5 shows the size of the adjusters at the initial parameter values, as the transfer increases from 100 to 10,000, the size necessary to maximally increase the recipient's rationality. The multiplier is the distance between the two adjusters.

The recipient's adjuster is above 1 for all values of T , indicating that the positive effect of reallocating the pre-transfer budget outweighs the negative effect of

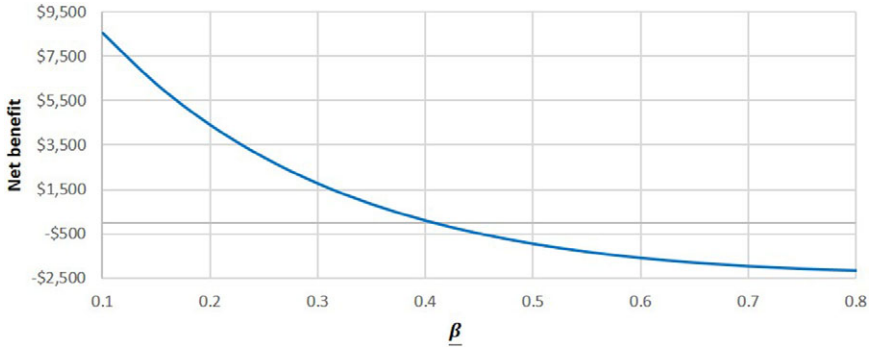


Figure 4 Net benefit generated by a transfer of \$8,100, including deadweight loss from taxation.

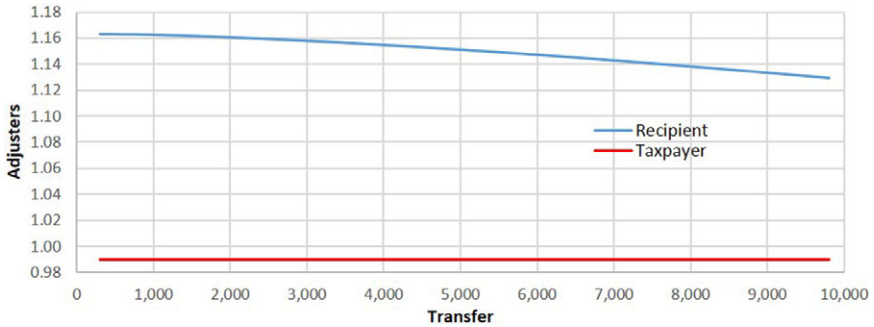


Figure 5 Recipient and taxpayer adjusters as transfer size increases.

allocating the transfer inefficiently, even when the transfer is small enough to increase rationality only a little. The reason for this is that, while the reallocation caused by a small increase in rationality is small in proportional terms, it is acting on a large-enough pre-transfer income to make a big difference, relative to the quite small harm caused by inefficient allocation of the quite small transfer.

At lower pre-transfer recipient incomes the results may look quite different. First, consider a case in which all of the income parameters are \$10,000 less than above, in other words, $M_0 = 5,000$, $\underline{M} = 5,000$, and $\bar{M} = 15,000$. This case is represented as recipient 1 in Figure 6, which depicts the adjusters for the recipient and taxpayer. The recipient’s adjuster starts below 1 and eventually rises above it. This is because, for any size of transfer, the effect of reallocation is smaller than above, because the size of pre-transfer budget that is being reallocated is smaller. As the transfer gets bigger, both the transfer and the pre-transfer budget are allocated more and more efficiently, leading eventually to an adjuster above one. Clearly, even for this lower level of pre-transfer income, the benefits of increased rationality are considerable for even modest transfers.

For recipient 1 in Figure 6, I maintained the assumption that $M = M_0$; in other words, the income level at which rationality begins to increase is equal to the recipient's pre-transfer income, so that the benefit of more efficient reallocation of the pre-transfer budget occurs with even very small transfers. When that assumption is relaxed, things look quite different. Recipient 2 has a pre-transfer income of \$10,000 but the rationality effect of getting out of poverty does not begin until \$15,000, as in the original setup. Not surprisingly, for transfers that do not increase rationality, the recipient's multiplier is flat, and well below that of the taxpayer, rising only when the threshold income is reached. It takes a considerable transfer to generate positive net benefits for society.

Thus far, the largest transfer I have considered is that just large enough to maximize recipient rationality, but it is informative to consider what happens for larger transfers. Figure 7 presents the adjusters (on the left axis) and the value generated by the transfer (on the right axis) for transfers up to \$30,000, using the original parameter values. Note that a transfer of \$10,000 is sufficient to raise the

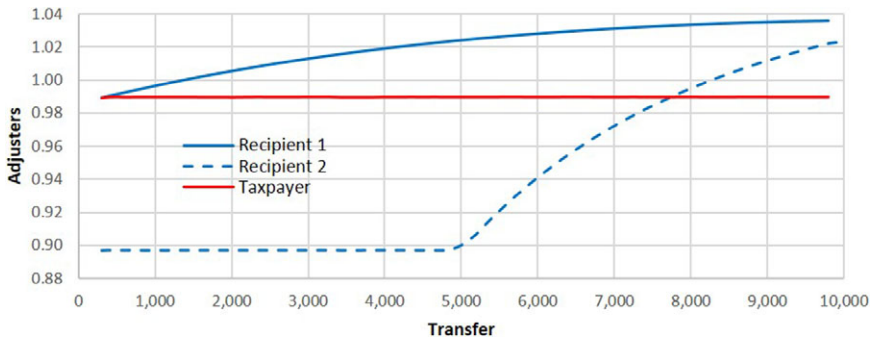


Figure 6 Adjusters at lower levels of initial recipient income.

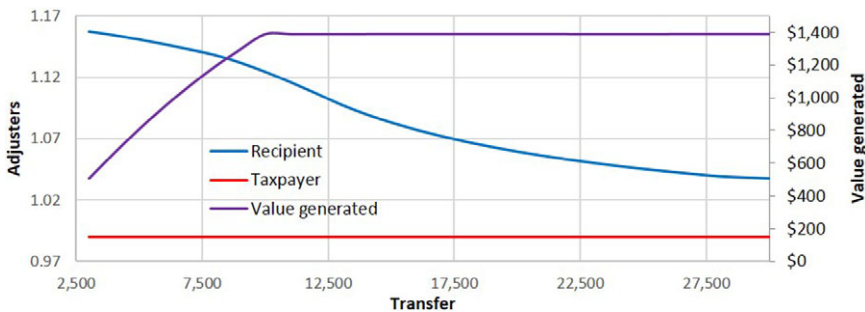


Figure 7 Adjusters and net benefit for very large transfers.

recipient's rationality to the level of the taxpayer. Beyond that point, the recipient's adjuster decreases because, while the benefit generated by reallocation is constant beyond that point, every dollar of additional transfer is allocated inefficiently, so that the reallocation benefit is attenuated. It will converge to the taxpayer's adjuster but will always remain above it. The net benefit (not including deadweight loss) increases to the point of maximal rationality, but stays constant beyond that point, as each dollar of additional transfer is misallocated to the same degree by both the recipient and the taxpayer.

5 The value of in-kind transfers

As Currie and Gahvari (2008) relate, a large proportion of the money spent by governments on redistributive programs, especially in developed countries, is in the form of in-kind rather than cash transfers. Standard economic theory predicts that in-kind transfers will always be less efficient than cash transfers, because they will distort the behavior of the recipient away from their utility-maximizing allocation of resources across goods. Currie and Gahvari review various explanations for the existence of in-kind transfers. These include paternalistic altruism, overcoming moral hazard in the uptake of redistributive programs, and overcoming the labor-supply distortions of income taxes by providing complements to labor income. Not included is the idea that people in poverty might misallocate their resources due to irrationality, so that paternalistic in-kind transfers could make them better off than they would make themselves with a cash transfer of the same value (even if the cash transfer would increase their rationality). A crucial component of this idea is the normative assumption that individuals have a set of "true" preferences, the maximization of which is the object of the paternalist's in-kind transfer. The idea that individual's choices are based on a different, irrational, set of preferences has been taken as a justification for paternalism by Le Grand and New in their very thorough book on the relationship between behavioral economics and paternalism (Le Grand & New, 2015), though they do not mention in-kind transfers as an example of the kind of paternalism that could be thus justified.

The idea is that the paternalist can estimate the consumption bundle that would maximize true utility, B in Figure 1, and give individuals the bundle of in-kind transfers necessary to get them to that consumption bundle, or as close to it as possible. In this section, I first demonstrate how the paternalist would determine the optimal bundle of transfers under a variety of conditions and then explore the likelihood that the paternalist, in the face of plausible values of the parameters of my simple model of present bias, could actually improve upon the recipient's allocation of a cash transfer.

I begin with the assumption that an in-kind transfer with a given dollar cost will raise recipients' rationality to the same degree as the same number of dollars in cash. It seems reasonable to believe that this might be an adequate approximation. Next, I note the role of fungibility of the in-kind transfer in the recipient's actual allocation. Technically, after receiving an in-kind transfer, the recipient can reallocate their pre-transfer consumption of one good to the consumption of the other good, allowing them to consume up to M_0 , their pre-transfer budget, of either good. In reality, recipients of in-kind transfers typically do not reallocate their pre-transfer budget as much as observed price and income effects would dictate, the so-called flypaper effect. In other words, they do not treat the in-kind transfer as if it were fully fungible.

Let us use λ to denote the maximum proportion of the transferred good that the recipient will potentially reallocate. For example, if an individual received a transfer worth T , consisting entirely of good Y , the flypaper effect would allow them to reallocate up to λT of their pre-transfer consumption of Y . Sometimes the way this is stated is that they would "spend" at least $(1 - \lambda)$ of the transfer on Y . In terms of the flypaper analogy, $(1 - \lambda)$ of the in-kind transfer would "stick" to Y . Estimates of λ lie close to 0.5,¹⁶ meaning that the quantity of good Y consumed by the individual under an in-kind transfer would increase by at least half the size of the transfer, which is another way of saying that, if the transfer consisted entirely of good Y , they would reallocate no more than $\frac{1}{2}T$ of their pre-transfer consumption of Y to X . This places a constraint on the recipient's ability to reallocate their pre-transfer budget in order to achieve their preferred post-transfer bundle.

Let (X_T, Y_T) be the in-kind bundle of goods transferred by the paternalist, and let (X_i, Y_i) be the bundle of goods at point $i \in \{B, C, D\}$ from Figure 1 (for example, X_C is the quantity of good X consumed by the irrational self before the transfer, and X_B is the quantity that the rational self would want to consume after the transfer, if she could, which is the paternalist's target).

The recipient will always want to consume more of good X than the paternalist wants them to, and will thus reallocate their pre-transfer consumption of Y to the best of their ability in pursuit of their irrationally preferred post-transfer bundle. There will always be a maximum amount that they can reallocate, and that maximum is crucial for understanding the conditions under which the paternalist can make the recipient better off than with cash. Assuming that the paternalist will never give more of X than would be necessary to get the recipient to point B , the optimal post-transfer bundle, the recipient will only ever reallocate good Y , and the maximum they will be able to reallocate will depend on whether the flypaper effect is "binding," that is, if the maximum amount of Y the flypaper effect will allow them to reallocate, λY_T , is less

¹⁶ Hastings and Shapiro (2018).

than their pre-transfer consumption, Y_C . In particular, the maximum the recipient can reallocate will be the smaller of Y_C , the quantity they were consuming before the transfer, and λY_T , the proportion of the transferred quantity of Y that the flypaper effect will allow them to reallocate from their previous consumption level. In other words, if the flypaper effect is “binding,” they will only be able to reallocate a maximum of λY_T units of their pre-transfer consumption of good Y but if the flypaper effect is not binding, then they will be able to reallocate all of their pre-transfer consumption of Y , which is to say Y_C . Thus, after reallocating their pre-transfer consumption of Y to the best of their ability, the maximum the recipient can consume of good X is the sum of their pre-transfer quantity, X_C , and the maximum quantity of Y they can reallocate. I define this maximum post-transfer consumption of X as $X_{max} = \min \{X_C + Y_C, X_C + \lambda Y_T\} = \min \{M_0, X_C + \lambda Y_T\}$ (because $M_0 = X_C + Y_C$). The first element is how much X the recipient can consume post transfer if the flypaper effect is not binding, that is, if $\lambda Y_T > Y_C$, while the second element is how much X they can consume if the flypaper effect is binding.

Let’s walk through an exhaustive and mutually exclusive set of conditions to see what must be true for the paternalist to be able to make the individual better off with an in-kind transfer than they would have made themselves with a cash transfer. First, if X_D , the recipient’s preferred post-transfer quantity of X , is less than X_{max} , it means that the recipient can achieve their preferred consumption of X through reallocation of their pre-transfer consumption of Y . In other words, if $X_D \leq X_{max}$, then even if the paternalist gives only Y , the recipient is able to reallocate enough of their pre-transfer Y to X to get them to their preferred post-transfer bundle, and there is nothing the paternalist can do to prevent the recipient from doing so. Thus, at best, the paternalist can do no better than cash. This is illustrated in Figure 8. In this and the subsequent figures, I will assume the flypaper effect is non-binding, which is to say, $X_{max} = M_0$. This is purely to simplify the diagram.

Now, if $X_D > X_{max}$, meaning that if the paternalist gives only Y , the recipient cannot reach their preferred post-transfer bundle, there are two possibilities. One is that X_B , the paternalist’s preferred quantity of X , *can* be reached through reallocation of pre-transfer Y . In other words, $X_B \leq X_{max}$. In this case the recipient will try to get as close to X_D as possible, by reallocating as much of good Y as the flypaper effect will allow them to, locating at X_{max} . They are closer to the paternalists preferred bundle than they would like to be, but not all the way to it, making them better off than under cash. In this case the paternalist will give a transfer consisting exclusively of good Y . This is illustrated in Figure 9.

The other possibility is $X_B > X_{max}$, meaning that the paternalists preferred post-transfer bundle *cannot* be reached through reallocation of a transfer consisting exclusively of Y . In this case the paternalist will want to give a transfer that includes some quantity of good X in order to make it possible for the recipient to reach X_B . The

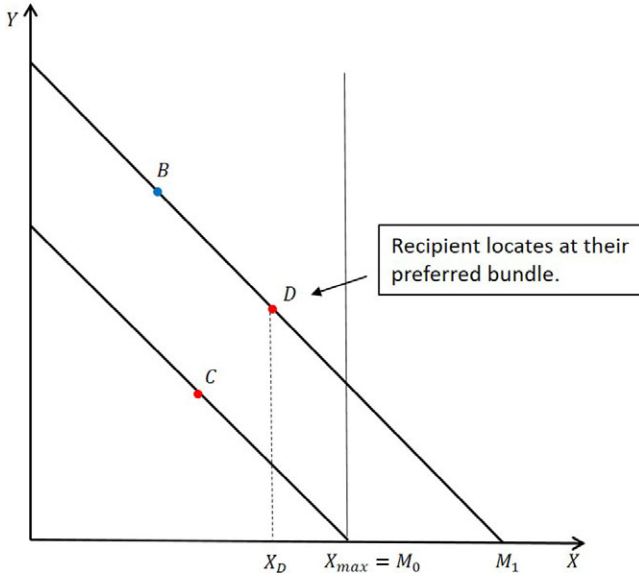


Figure 8 Recipient's preferred bundle can be achieved through reallocation.

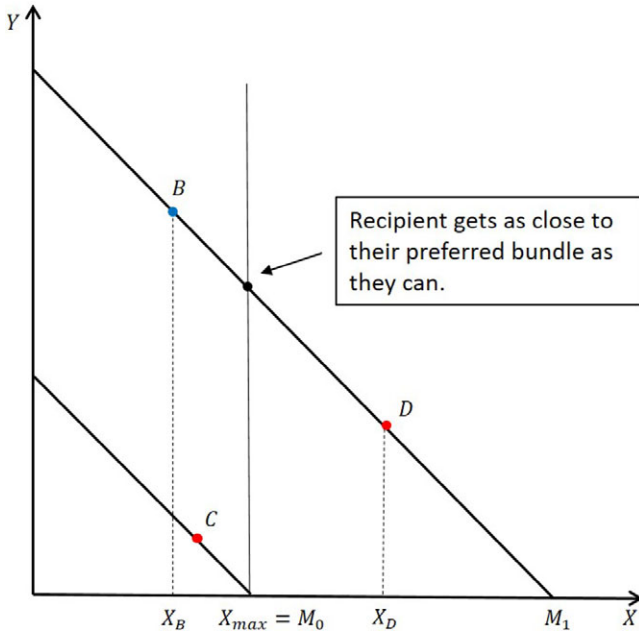


Figure 9 Paternalist can keep recipient from achieving preferred bundle but not perfectly.

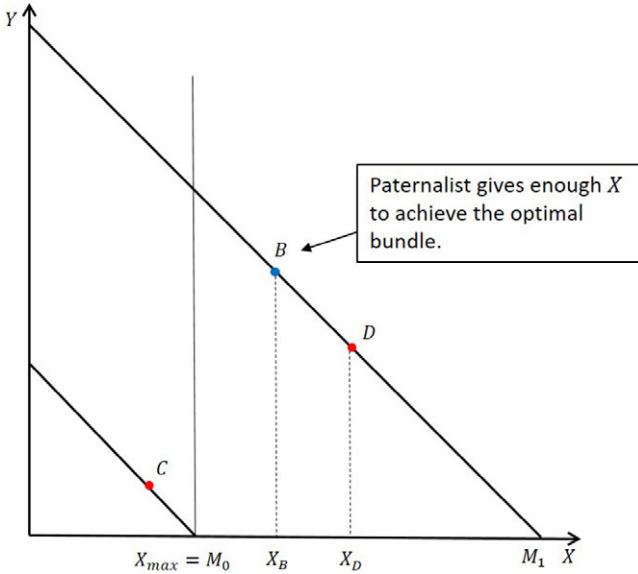


Figure 10 Paternalist can perfectly target optimal bundle.

question the paternalist must answer is, for any given transferred bundle, what will be the recipient’s ultimate consumption, after they reallocate their pre-transfer Y to the best of their ability? Knowing that, the paternalist can choose (X_T, Y_T) so that the recipient locates at point B . I derive the optimal value of X_T in an appendix. Suffice it to say, with enough information, the paternalist can always succeed in getting the recipient to exactly the rational bundle. This is illustrated in [Figure 10](#).

We now have three cases. The first is $X_D \leq X_{max}$, the recipient can achieve their preferred bundle even if the in-kind transfer consists entirely of Y , in which case the paternalist gives all Y and the in-kind transfer has the same welfare effect as cash. The second is $X_B < X_{max} < X_D$, the paternalist can’t get the recipient to the rationally optimal bundle but by giving only Y , can keep them from locating at their irrationally preferred bundle, thus making them strictly better off than a cash transfer. The third is $X_B > X_{max}$, the paternalists preferred bundle can be achieved by giving the recipient the correct mix of X and Y , in which case the paternalist maximizes the recipient’s welfare.

It would seem, then, that in-kind transfers can do no worse than cash, and can, under certain conditions, do better. However, in my simple model, the conditions under which the recipient would want to consume more of good X than possible, given their pre-transfer income and the flypaper effect – in other words, the conditions under which $X_D > X_{max}$, which is necessary for the paternalist to improve upon

cash – are highly implausible. Holding all parameters constant at their initial values and varying one at a time, we would need one of the following: $\beta \cong 0.01$, $M_0 \cong \$920$, $b \cong 0.01$, $T > \cong 213,000$, or $\lambda \cong 0.06$, all of which seem implausible. Attempts to make the recipient want more of X than they are capable of achieving under an all- Y in-kind transfer require at least one of the parameters to be implausible. It is possible that in the presence of additional forms of irrationality, and additional goods affected by irrationality, paternalism might be more efficient than cash transfers in a more plausible range of conditions, but as the number of irrationalities and goods goes up, the number of parameters that the paternalist must estimate grows, making it harder and harder to design an optimal transfer. Furthermore, given that there are non-efficiency reasons to favor cash, such as autonomy and human dignity, we might want to target paternalistic in-kind transfers to only those for whom they would be welfare enhancing, and doing so might prove practically or politically infeasible.

6 Discussion and conclusion

I have demonstrated that, under a fairly widely accepted assumption about the normative validity of rational preferences, the presence of irrationality among recipients of government assistance and taxpayers, and the relationship between income and irrationality, can affect the value to society of cash transfers. Irrationality can destroy value by causing misallocation of transfers, but if the effect of income on rationality is sufficiently positive, transfers may cause individuals to reallocate their pre-transfer budget more rationally, leading to an increase in value. I have shown, in a simple model of present bias, the effect on the appropriate “rationality multiplier” of (a) the degree to which poverty affects rationality, (b) the depth of pre-transfer poverty, and (c) the size of the transfer. The stylized results are these. (i) *Ceteris paribus*, the multiplier is increasing in the strength of the effect of poverty on rationality (i.e., the difference between the irrationality of taxpayers and the deepest level of irrationality caused by poverty) because when the effect of poverty is high, transfers will cause a large increase in rationality, and hence a large increase in the efficiency of the allocation of the pre-transfer budget. (ii) *Ceteris paribus*, the multiplier is decreasing in the pre-transfer budget, and may be negative. There are two reasons for this. First, for transfers that increase rationality, when the pre-transfer budget is small, the increase in efficiency caused by reallocation of the pre-transfer budget is commensurately small. Second, if the pre-transfer budget is below the level at which income begins to increase rationality, a transfer of any given size will increase rationality less, if at all. (iii) *Ceteris paribus*, for any transfer greater than the minimum necessary to raise the recipient’s rationality to the same level of the

taxpayer, the portion above that minimum will not increase social surplus, as it will be allocated with the same degree of inefficiency by the recipient and the taxpayer. Finally, I have demonstrated that the conditions under which a paternalist would be justified in giving an in-kind transfer instead of cash are limited, and owing to the challenges of identifying and targeting such individuals, I conclude that the case for in-kind transfers is not strong.

A number of points should be made regarding my analysis. First, my analysis rests upon the idea of “true” preferences, and assigns normative standing to those preferences. Bernheim and Rangel (2009) propose a different approach to welfare analysis in the context of irrationality. For any given form of irrationality, they define what they call “ancillary conditions” that capture the features of the choice environment that lead to irrationality-driven behavior. For example, in the context of present bias, the ancillary condition might be the time period in which the decision is being made, with “the present” being the condition under which preferences deviate from the standard model. In their approach, an outcome can be unambiguously identified as a welfare improvement if and only if it is preferred by the individual under all possible ancillary conditions. For example, under present bias, in order for an analyst to identify an unambiguous welfare improvement, an outcome must be preferred by the individual in all periods. If an outcome makes the person better only under certain ancillary conditions but makes them worse off under other ancillary conditions, their approach cannot determine whether the outcome is welfare enhancing or not. One of the implications is that, even if a present-biased individual would prefer to start saving for retirement next year, Bernheim and Rangel might not be able to say that doing so would make them better off, because when next year arrives, their present-biased self might not want to save.

This approach severely restricts the range of policies that can be said to make an irrational individual better off: anything that would change their behavior at any point in time, or under any conditions – short of providing them with options previously unavailable – cannot be said to make them better off because it would necessarily result in an outcome that they themselves would not have preferred at that point in time, or under those conditions. This is an essentially anti-paternalistic normative stance, which many would consider advantageous. But its implications might seem counter-intuitive to some.

More problematically, it is not obvious how one would apply Bernheim and Rangel’s approach to my analysis, because their approach is silent on how to evaluate outcomes that change a person’s preferences under some ancillary conditions. For example, if a cash transfer has the effect of increasing the β parameter in a β, δ model of present bias, Bernheim and Rangel offer no guidance as to whether welfare analysis should be conducted using the pre-transfer or the post-transfer value of β . If we were to treat the value of β itself as an ancillary condition, their approach would

not allow us to say that reducing an individual's present bias made them better off. This seems highly counter-intuitive.¹⁷ The normative stance I adopt may be objectionable to some, but I believe it is reasonable, and that it is the only way to make progress.

Next, there are some circumstances in which we might be inclined to consider in-kind transfers, despite the discussion above. In cases of substance abuse and mental illness, the issues of identifying and targeting unambiguously beneficial in-kind transfers might not be insurmountable. Of course, there would remain issues of autonomy and dignity that some might consider to outweigh the welfare benefits. We might also consider in-kind transfers when there is incomplete, or incorrect information about the benefits or costs of goods, which could affect allocation of cash transfers similarly to irrationality. If an individual incorrectly believes that the costs of a good are lower than they actually are (e.g., unhealthy foods), or that the benefits of a good are higher than they actually are (e.g., a nice car), they will under- or over-allocate to that good. This will cause the individual to allocate a cash transfer in ways that will generate an amount of welfare for themselves that is less than the dollar value of the transfer.¹⁸ A well-designed paternalistic in-kind transfer could increase the welfare of transfer recipients relative to cash.

Next, it is important to note that one of my strongest findings is that there is a wide range of conditions under which cash transfers generate positive net benefits, by increasing the efficiency with which recipients allocate their pre-transfer budget. When considering cash transfers, one of the questions policy makers might consider is whether the transfer will raise recipients income enough to improve their decision-making and generate more value for recipients than is lost by taxpayers. If the answer is yes, there may be no tradeoff to be made between efficiency and distributional concerns.

It is also worth noting that improving rationality is not the only reason cash transfers could generate non-zero net benefits for society. Poverty has other effects on the efficiency of allocation of money. For one thing, it is likely to exacerbate liquidity constraints.¹⁹ Many welfare-enhancing goods or activities, such as education, require sizable up-front investment. Purchasing such goods might optimize the allocation of lifetime income, but liquidity constraints could make it impossible for people in poverty to do so, leading to inefficiency. Cash transfers might allow them to allocate more efficiently. The value of transfers may also be affected by lack of information

¹⁷ The same would be true for other forms of irrationality. If individuals fail to satisfy the assumption of rational expectations by incorrectly inferring probabilities, Bernheim and Rangel would not be able to say that helping them make better inferences made them better off.

¹⁸ Head (1966) makes exactly this point, referring to goods of this sort as merit (or demerit) goods.

¹⁹ Haushofer and Fehr (2014).

about long-term impacts of certain goods, the possibility that parents may treat impacts on their children (especially in the long run) as externalities, and the possibility that financial literacy may be positively correlated with income. There is also considerable evidence that poverty has deleterious effects that are unrelated to allocation of money. For example, as reviewed above, poverty causes stress, and stress, in turn, causes health problems, over and above any effect of how one allocates one's time and money.²⁰ Stress also makes it harder to learn,²¹ which is likely to affect long-term labor-market outcomes. If cash transfers reduce the stress of poverty, they may improve health and labor-market outcomes directly. A complete benefit-cost analysis of a cash transfer would need to account for all of these impacts, which would make the modeling exercise more ambitious.

A final comment is that it is possible that high income also negatively affects decision-making. High-income individuals may pay less attention to the future, or allocate less cognitive effort to decision-making in general, owing to the high opportunity cost of their time. This might or might not be rational. Or, if high-income individuals are more subject to scarcity in the domain of time than other individuals, in ways that result in increased irrationality, taxing the wealthy might reduce their true welfare by less than the dollar value of the tax revenue raised, by reducing the amount of consumption subject to irrationality. If there were evidence of these effects, my approach would need to be extended to incorporate them.

I have noted that the evidence I cite in support of the contention that poverty increases irrationality is not unassailable. Future research should extend and confirm the existing findings on the effect of poverty on rationality, and in particular the extent to which external supports in getting out of poverty, such as cash transfers, can increase rationality. There is also much work to be done on adequately modeling the range of irrationalities that are significantly affected by poverty, and that cause significant misallocation. If the net benefit of cash transfer programs is to be correctly estimated, this line of research may provide a practicable way to achieve that goal. In the meantime, analysts should proceed with caution.

Supplementary material

To view supplementary material for this article, please visit: <https://doi.org/10.1017/bca.2020.22>.

²⁰ For a review, see Steptoe and Ayers (2004).

²¹ For a review, see Bangasser and Shors (2010).

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