In-kind Transfers, Efficiency, and Hidden Saving

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Abstract

Using a simple two-period job search model, this paper argues that public provision of in-kind transfer is more efficient than transfers in cash. Our analysis suggests that moral hazard would become more severe if recipients can save the transfer payment privately (the hidden saving problem), inducing them to make less effort to find jobs (that is, double deviation problem). The recipients cannot, however, save unused in-kind benefits, in particular job training, food subsidy, and assisted rental housing. We show that to avoid the hidden saving problem, allocative efficiency requires overprovision of in-kind transfers. This partly explains why a country with more competitive political institutions over-provides in-kind transfers and grossly undersupplies cash grants.

JEL Classification: H42, H31

Keywords: In-kind transfers, cash transfers, moral hazard, hidden saving

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1 Introduction

This paper investigates why governments employ substantial in-kind transfers despite the contention that, in terms of the recipient’s welfare, in-kind transfers are generally inferior to cash transfers.

With the exceptions of a few studies, in-kind transfers are rarely justified on the basis of efficiency. Cash transfers are typically considered more efficient than in-kind transfers, because economic agents know what is best for them. Despite this simple observation, in-kind transfer programs are widely used for redistribution purposes. On average, countries from the Organisation for Economic Co-operation and Development (OECD) give about 50 percent of their social aid through in-kind transfers, including food subsidies, health care, housing, child care, and education (Marical et al. 2006; Garfinkel et al. 2006). Moreover, recipients of in-kind benefit programs are not typically allowed to resell their allotments. This makes it difficult for the recipients to equalize the marginal rate of substitution and the price ratio, which results in a “corner” solution.

Traditional explanations for the existence of in-kind transfers include commodity egalitarianism (donors care about recipients’ consumption of specific commodities), self-targeting (non-targeted individuals are less likely to take in-kind benefits than cash grants), and political rent-seeking (industries support in-kind programs in their products) (Blackorby and Donaldson 1988; Mulligan and Philipson 2000; Gahvari and Mattos 2007; Currie and Gahvari 2008; Rosen and Gayer, 2010, p. 272).

On the contrary, some literature has suggested that in-kind transfers can enhance efficiency. These studies view in-kind subsidies as a response to the Samaritan’s dilemma—the recipients are entitled to receive future cash grants only if they remain poor—or as a means of improving tax efficiency via increased labor supply (Buchanan 1975; Lindbeck and Weibull 1988; Bruce and Waldman
Building on these insights, we offer a simple job search framework which provide an efficiency argument for in-kind transfers. More specifically, we consider a two-period model with two commodities—cash and goods in-kind—and two types of agents—unemployed and employed. In the first period, the unemployed agent searches for a job. The probability of the agent finding a job in the next period depends on the effort. The employed agent, on the other hand, becomes unemployed in the second period with an exogenously given probability. Both types of agents consume cash and goods in-kind during each period.

In our model, the consumption of the commodities is determined by a benevolent social planner. The planner observes whether a particular agent is employed. However, the effort level that determines the probability of employment is private, known only by the unemployed agent. Thus, the consumption assigned to the unemployed agent must depend on their employment status in the second period, rather than their effort in the first period. This asymmetric information makes it difficult for the planner to control the agent’s moral hazard problem.

Our central insight is that the moral hazard would become more severe if the unemployed agent can save the transfer payment in the first period without the planner’s knowledge.\footnote{We assume that the agent does not have the hidden saving technology for in-kind transfers.} This hidden saving problem induces agents to make less efforts to find jobs, because saving reduces the risk from staying unemployed in the future. We show that the hidden saving problem always exits in the sense that when the agent deviates from making high effort, he always saves the transfer payment—a phenomenon known as the double deviation problem (Chien and Song 2013).

We find that the incentive-constrained efficient allocation (i.e., the solution
to the planner’s optimization problem) requires that the two agent types have different marginal rates of substitution between two commodities.\footnote{Of course, the planner cannot provide only in-kind transfers, as this would decrease efficiency substantially by an extreme departure of the marginal rate of substitution from the first best marginal rate of substitution.} This is our main finding and shows that over providing in-kind transfers to the unemployed is necessary for efficiency. Intuitively, the planner cannot allow the unemployed agent to be cash rich when the hidden saving problem is present. Given enough extra cash, the agent can save the transfer so as to insure against the future risk. This hidden saving problem distorts the effort level that the planner wants to implement. Thus, the planner will want to provide more of the goods in kind, which the agent cannot save.\footnote{Even food stamps cannot be saved as they will expire and are prohibited from resale. In addition, the typical allotment of food stamps is worth less than the food budget of most households (Currie and Gahvari 2008).}

This paper is organized as follows. In Section 2 we briefly describe how our paper is related to the existing literature that provides efficiency arguments in favor of public provision of in-kind transfers. In Section 3, we offer a theoretical model of efficient allocation, and provide an explanation for why in-kind transfers could enhance allocative efficiency. In Section 4, we discuss how our results are related to some real world facts about the public provision of transfers. Proofs are provided in the Appendix.

\section{Efficiency of In-Kind Transfer}

Some unorthodox literature posits that in-kind transfers may increase economic efficiency relative to cash transfers (for a more general survey, see Currie and Gahvari 2008). One such argument centers around the inability of a government to commit to no bailouts—that is, cash transfers reduce the recipient’s effort to bail himself out. The Samaritan’s dilemma arises because the anticipation
of future transfers undermines the recipient’s current incentives to work or invest in human capital (Buchanan 1977; Lindbeck and Weibull 1988; Bruce and Waldman 1991; Pedersen 2001; Schmidtchen 2002). This time-inconsistency problem can be substantially reduced if aid is provided through in-kind benefits, such as job training and insurance (Bruce and Waldman 1991; Coate 1995; Miyazawa 2009).

Alternatively, some studies suggest that in-kind transfers improve the efficiency of the income tax system (Munro 1992; Gahvari 1994, 1995; Currie and Gahvari 2008; Bloomquist et al. 2010). Over providing in-kind transfers, such as education and child care, can potentially stimulate labor supply, offsetting the extant deadweight loss from income tax.\(^4\) Moreover, increases in the labor supply will generate extra tax revenues, which can be used to finance more transfers, positively affecting aggregate welfare. In-kind transfers can be Pareto improving to the extent that they would complement labor supply. Currie and Gahvari (2008), however, claim that the time horizon matters, because in-kind transfers affect labor supply only in the long run.

Our study advances the current literature by explicitly incorporating job searches into the Samaritan’s dilemma model and by considering the moral hazard problem in a dynamic setting for the tax efficiency argument. In particular, we address the hidden savings problem that connects the two previous ideas: Samaritan’s dilemma and tax efficiency via labor supply.

Our results are related to the optimal tax literature (Diamond and Mirrlees 1971a, b; Stiglitz and Dasgupta 1971; Atkinson and Stiglitz 1972). These studies argue that even if labor supply cannot be taxed properly (due to the fact that earning abilities are difficult to observe), a government can implicitly tax the labor supply by taxing commodities that complement the labor supply. Our results are somewhat reminiscent of this argument. If high effort in job search (loosely interpreted as high labor supply) is not directly enforceable, the

\(^4\)Giving cash transfers may not increase labor supply due to the income effect.
government can instead subsidize the commodity that is less susceptible to the hidden savings problem.

3 Model

To examine the real collective decision making, public choice theory models a government policy of redistribution alternatively as a result of competition between interest groups, the optimization behavior of a social planner, or the choice of a Leviathan (Lee et al. 2013). Our study employs a simple social planner model to characterize the incentive-constrained efficient allocation because this approach easily incorporates the pre-eminent effect of a hidden saving in examining the relationship between key variables.

Our model is closely related to Chien and Song’s (2013) principal-agent model, in which an agent makes an effort and the principal awards the agent with outcome-contingent payments. They showed that if the principal can award two types of commodities, the principal prefers the commodity that does not suffer from a hidden saving problem.\(^5\)

Consider a two-period economy with a continuum of agents with a unit mass in each period. There are two types of agents in the initial period: an unemployed type—who may find a job in the next period—and an employed type—who may lose their job in the next period. The population share of the unemployed is \(\mu\) (\(0 < \mu < 1\)) in the first period. There are two commodities, \(x\) and \(y\), in the first period, and \(X\) and \(Y\) in the second period. Note that \(x\) and \(X\) (\(y\) and \(Y\)) simply distinguish the consumption in the two periods.

The unemployed type makes an effort, \(e\), to search for a job during the

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\(^5\)Our model differs from that of Chien and Song in that (i) we consider a welfare-maximizing policy (instead of the profit maximization of a principal), and (ii) we have two types of populations, the unemployed and the employed, in order to derive a discrepancy in the marginal rate of substitutions between the two groups (instead of a single agent and the given price ratio).
first period. This effort is the agent’s private information and determines the distribution of the outcome in the second period. For simplicity, we assume that the unemployed agent can exert either a high or low effort for their job search. The discrete choice of the effort level makes it possible to avoid the issue of first order approach—that is, an agent’s first-order condition on their effort is a constraint of an optimization problem. More specifically, there are two effort levels, \( e_H \) and \( e_L \), with \( e_L < e_H \). The outcome \( s \) is either “found a job” or “not found a job,” denoted by “f” and “n.” We denote the probability of finding a job by \( P(f|e) \) when the agent makes effort \( e \in \{e_H, e_L\} \). In the second period, the outcome \( s \in \{f, n\} \) is realized.

An employed type, who makes no effort in the first period, either becomes unemployed with probability \( Q(n) \) or remains employed with probability \( Q(f) = 1 - Q(n) \).

The \( x_i \) and \( y_i \) denote the first-period consumption of an agent \( i \in \{u, j\} \) (where \( u \) and \( j \) denote the unemployed and the employed in the first period, respectively). \( X_i(s) \) and \( Y_i(s) \) denote the second-period consumption at state \( s \in \{f, n\} \).

An agent has a hidden saving technology for goods \( x_i \), but not for goods \( y_i \). That is, the agent can transfer the first-period consumption of \( x \) into the second period without the planner’s knowledge. Let \( \sigma_k \) be the unemployed

\( ^6 \)If an agent can either save or borrow secretly, the first order approach might be invalid, because the agent’s decision is not necessarily globally concave in effort and saving (e.g., see Cole and Kocherlakota 2001; Kocherlakota 2004; Ábrahám and Pavoni 2008). Ábrahám et al. (2011) characterized sufficient conditions for global concavity in saving and effort for the agent’s problem, under which the first order approach is valid. The sufficient condition for such a global concavity requires that the payoff from a double deviation is sufficiently small compared to the loss of deviation from the optimal consumption or from the effort level alone. In other words, the possibility of simultaneous deviation (both in savings and effort) is assumed away by imposing a sufficient condition. Following Chien and Song (2013), we assume discrete effort levels and consider the agent’s optimal saving decisions at each effort level.
type’s optimal saving when the agent makes effort \( e_k \), \( k \in \{H, L\} \). We assume that the agent faces a zero interest rate for their saving.\(^7\) Given the planner’s resource allocation \((x_u, y_u, X_u(f), Y_u(f), X_u(n), Y_u(n))\), the unemployed agent’s maximized utility is

\[
\max_{e, \sigma} \left[ u(x_u - \sigma) + v(y_u) - c(e) + \sum_s [U(X_u(s) + \sigma) + V(Y_u(s))] P(s|e) \right]
\]

(1)

where \( u(\cdot) + v(\cdot) \) and \( U(\cdot) + V(\cdot) \) are temporal utility functions for periods 1 and 2, respectively, and \( c(e) \) is the agent’s cost of effort.

The utility functions \( u(\cdot) \) and \( U(\cdot) \) (and \( v(\cdot) \) and \( V(\cdot) \)) simply distinguish periods 1 and 2. To simplify the analysis, we assume an additive separability of the utility function with respect to the consumption of \( x \) and \( y \). We also assume that both the employed and unemployed agents have identical utility functions. There is no discount between periods. These simplifications do not alter our results qualitatively.

The planner implements a high effort \( e_H \) and seeks to prevent the unemployed type’s deviation to a low effort.\(^8\) Thus, the “incentive compatibility constraint” for the unemployed agent is given by

\[(e_H, \sigma_H) \in Eq.(1)\]

For simplicity, but without a loss of generality, we assume that \( \sigma^*_H = 0 \).\(^9\) A hidden saving problem exists because \( \sigma^*_L > 0 \) (as will be formally derived in

\(^7\)A non-zero interest rate would not change our results qualitatively.

\(^8\)To make our analysis meaningful, we assume that the planner’s benefit of implementing a high effort exceeds the combined cost of allocating the resources and of implementing the incentive compatibility.

\(^9\)Suppose, under optimal allocation \((x^*_u, y^*_u, X^*_u(\cdot), Y^*_u(\cdot))\), that the unemployed agent chooses nonzero \( \sigma_H \). However, from the new allocation \((x^*_u - \sigma^*_H, y^*_u, X^*_u(\cdot) + \sigma^*_H, Y^*_u(\cdot))\), it is readily seen that this implements zero saving, as the allocation does save for the unemployed agent. It is trivial that this new allocation implements high effort \( e_H \). Thus, we assume \( \sigma_H = 0 \) without a loss of generality. Alternatively, we can assume \( \sigma^*_H > 0 \), without changing the results qualitatively.
Intuitively, given that $P(f|e_H) > P(f|e_L)$, a consumption-smoothing agent with $e_H$ will save less than would be the case with $e_L$. Conversely, an agent who cannot save for the future will make $e_H$ to increase $P(f|e)$.

The hidden saving and the incentive compatibility constraints can be rewritten as:

$$u'(x_u) = \sum_s U'(X_u(s))P(s|e_H) \quad (2)$$

$$u'(x_u - \sigma_L) = \sum_s U'(X_u(s) + \sigma_L)P(s|e_L) \quad (3)$$

$$u(x_u) + v(y_u) - c(e_H) + \sum_s [U(X_u(s)) + V(Y_u(s))]P(s|e_H) \geq u(x_u - \sigma_L) + v(y_u) - c(e_L) + \sum_s [U(X_u(s) + \sigma_L) + V(Y_u(s))]P(s|e_L) \quad (4)$$

Equation (2) states that, for the unemployed to choose $\sigma_H = 0$, the consumption $(x, X(\cdot))$ must satisfy the Euler equation, which equates the first-period marginal utility and the second-period marginal utility. Equation (3) describes the optimal saving $\sigma_L$, given low effort $e_L$. With $\sigma_L$ derived from (3), the inequality shown in (4) indicates the incentive compatibility constraint for the effort level.

Additionally, we have the following resource constraints:

$$\mu x_u + (1 - \mu)x_j + \mu \sum_s X_u(s)P(s|e_H) + (1 - \mu) \sum_s X_j(s)Q(s) \leq w^x + w^X \quad (5)$$

$$\mu y_u + (1 - \mu)y_j + \mu \sum_s Y_u(s)P(s|e_H) + (1 - \mu) \sum_s Y_j(s)Q(s) \leq w^y + w^Y \quad (6)$$

More generally, the hidden saving problem can be shown as $\sigma^*_H < \sigma^*_L$. If the agent deviates to a low effort $e_L$, the probability distribution $P(s|e)$ will change, adjusting the optimal saving.

There is no information asymmetry for the employed type in the first period. Thus, there will be no incentive compatibility constraint. Since we will derive a condition similar to equation (2) for the employed type, we do not impose one for the employed.
where \(w^x\) and \(w^y\) (\(w^X\) and \(w^Y\)) are the given resources of goods \(x\) and \(y\) (\(X\) and \(Y\)) in period 1 (period 2). Note that the left sides of the constraints indicate the allocations made by the planner, and the right sides are the available resources.\(^{13}\)

Thus the planner’s maximization problem is given by:

\[
\max_{x_i, y_i, X_i, Y_i} \beta \left[ u(x_u) + v(y_u) - c(e_H) + \sum_s [U(X_u(s)) + V(Y_u(s))]P(s|e_H) \right] \\
+ (1 - \beta) \left[ u(x_j) + v(y_j) + \sum_s [U(X_j(s)) + V(Y_j(s))]Q(s) \right]
\]

subject to (2), (3), (4), (5), and (6)

where the multipliers of the constraints (2), (3), (4), (5), and (6) are \(\mu \lambda_H, \mu \lambda_L, \mu \alpha, p_x,\) and \(p_y\), respectively.\(^{14}\)

\textbf{Definition 1} The incentive-constrained efficient allocation is the solution of the planner’s problem (7) subject to (2) through (6).

Note that \(\beta\) denotes the distributional weight of the unemployed type, which is not necessarily equivalent to the population share \(\mu\). The planner’s problem does not include the Euler equations for the employed type, but Proposition 1 shows that the Euler equations for both \(x_j\) and \(y_j\) are, in fact, derived as the conditions for the incentive-constrained efficient allocation.

From the first order conditions (shown in (A1) through (A8) in the Appendix), we obtain:

\textbf{Proposition 1} (i) \(u'(x_u) \neq U'(X_u(s))\), (ii) \(v'(y_u) \neq V'(Y_u(s))\), (iii) \(u'(x_j) = U'(X_j(s))\), (iv) \(v'(y_j) = V'(Y_j(s))\).\(^{15}\)

\(^{13}\)There is one resource constraint for each good. However, even with temporal resource constraints (i.e., four resource constraints for the two goods and the two periods), the qualitative results will remain the same.

\(^{14}\)Note that the first three multipliers contain probabilities \(\mu\), so that the shadow values are in the same metric.

\(^{15}\)See the Appendix for proofs of all propositions.
In Proposition 1 (iii) and 1 (iv), efficient allocation ensures that the employed agent achieves consumption smoothing across periods and states—now satisfying the Euler equations for \((x_j, X_j(s))\) and \((y_j, Y_j(s))\). This is a natural outcome as the employed agent does not face the moral hazard problem. The unemployed agent, however, is not able to smooth consumption across states. Reflecting on (2), Proposition 1 (i) implies that marginal utilities of the second period consumption must differ by states—although the unemployed agent smooths expected consumption across periods.\(^{16}\) Proposition 1 (ii) gives a similar implication.

Simplifying the first-order conditions further, we derive the following

**Proposition 2**

\[
\frac{p_x}{u'(x_u)} = \frac{\beta}{\mu} + \alpha \left( 1 - \frac{u'(x_u - \sigma_L)}{u'(x_u)} \right) \tag{8}
\]

\[
\frac{p_x}{U'(X_u(s))} = \frac{\beta}{\mu} + \alpha \left( 1 - \frac{U'(X_u(s) + \sigma_L)}{U'(X_u(s))} \frac{P(s|e_L)}{P(s|e_H)} \right) \tag{9}
\]

We also show that the multipliers for (4), (5), and (6) are positive.\(^{17}\)

**Proposition 3** \(\alpha > 0, \ p_x > 0, \) and \(p_y > 0.\)

**Remark:** For simplicity, we assume \(\mu = \beta.\) If there were no hidden saving problem (i.e., the agent cannot save cash privately), (8) and (A5)—the first-order condition with respect to \(x_j\) become:

\[
u'(x_u) = p_x = u'(x_j) \tag{10}
\]

which implies that the marginal utility of \(x_u\) and \(x_j\) are equivalent to the shadow value of the resource constraint for \(x,\) or \(p_x.\) Note that \(p_x\) reflects the true value

\(^{16}\)From (2), \(u'(x_u) = P(f|e_H)U'(X_u(f)) + P(n|e_H)U'(X_u(n)).\) Thus, if \(u'(x_u) \neq U'(X_u(s)), \ U'(X_u(f)) \) and \(U'(X_u(n))\) cannot be the same.

\(^{17}\)Lemma 1 in the Appendix shows that \(\lambda_H = \lambda_L = 0.\) Even in this case, conditions (2) and (3) are binding. Formally, we can formulate an alternative planner’s problem without conditions (2) and (3), and show that the two conditions are not satisfied. See the Appendix for detailed discussions.
of an additional resource $x$. In the presence of the hidden saving problem (i.e., $\sigma_L > 0$), however, (8) and (A5) indicate that $u'(x_u) > p_x = u'(x_j)$ (since $u'(x_u - \sigma_L) > u'(x_u)$). The reason for this is straightforward: If additional $x$ is given to the unemployed agent, the hidden saving problem will break the incentive compatibility constraint. Thus, the value of the additional resource $x$ must be smaller than $u'(x_u)$.

Equation (9) simply shows that the planner assigns the second period consumption based on outcome. Given $\alpha$ and $\sigma_L$, (9) indicates that $X_u(f)$ must be greater than $X_u(n)$.\(^{18}\)

Additionally, we show that the hidden saving problem—instead of hidden borrowing—always exists.

**Proposition 4** $\sigma_L > 0$.

Finally, we show that the incentive-constrained efficiency requires that two types of agents have different marginal rates of substitution between $x$ and $y$.

**Proposition 5** The incentive-constrained efficient allocation implies

$$\frac{u'(x_u)}{v'(y_u)} > \frac{u'(x_u)}{v'(y_u)} \left[ 1 + \frac{\mu}{\beta} \left( 1 - \frac{u'(x_u - \sigma_L)}{u'(x_u)} \right) \right] = \frac{p_x}{p_y} = \frac{u'(x_j)}{v'(y_j)}$$

This is our main finding and reflects that, due to the hidden saving problem and moral hazards, the planner provides relatively less $x$ (cash transfers) and more $y$ (in-kind transfers) to the unemployed than would be the case with the employed. The inequality in (11) would turn into equality either if the hidden saving problem is not present (i.e., $\sigma_L = 0$ in (11)), or if moral hazard is not a concern (i.e, $\alpha = 0$ in (11)). This would then equalize marginal rates of substitution between $x$ and $y$ across both types of agents. Note also that even if the distributional weight assigned to the unemployed agent, $\beta$, is 1 (i.e., the planner cares only about the unemployed), the inequality holds as long as both $\sigma_L$ and $\alpha$ are positive.

\(^{18}\)Note that $P(f|e_L)/P(f|e_H) < 1$ and $P(n|e_L)/P(n|e_H) > 1$. 

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4 Discussions and Conclusion

Figure 1 illustrates the potential outcomes under an in-kind transfer program with the hidden saving problem. Reflecting the theoretical model, the preferences depend on the composite consumption good, $x$, and a good subject to in-kind transfers, $y$. Unemployed agents prefer a positive saving, $\sigma$, other things equal. The original budget constraint is represented by $EF$ on the $xy$-plane. Cash transfers shift the budget line upward to $GH$. Note that $FH$ measures the amount of cash transfer, assuming that the price of $x$ is unity. In-kind transfers of equal cost shift the budget line to $GBF$.19 The agent clearly prefers cash transfers—choosing point $A$—to in-kind transfers—with the choice being at point $B$. Under in-kind transfers, $y$ is over provided.

However, if the agent saves some or all of the cash transfers, the current period’s budget constraint under the cash transfers shifts from $GH$ forward up to $G'H'$.20 The diagram shows that the unemployed agent can pick point $C$ over point $A$, implying a low effort (since a positive saving induces a low effort level). Thus, in order to enforce high effort, the planner should employ an in-kind transfer program, limiting the agent’s consumption choice at point $B$.

Our theoretical results are in line with the fact that the U.S. government is more likely to give cash transfers to the elderly than to other age groups (Currie and Gahvari 2008). On the contrary, the fraction of aid given in cash to families with children is relatively small. Hidden saving and associated moral hazard problems are less of an issue for the elderly.

Existing evidence also suggests that the United States typically gives a larger fraction of aid through in-kind subsidies, compared to Western European countries (Marical et al. 2006; Garfinkel et al. 2006; Currie and Gahvari 19 Topping up is not allowed.
20 $G'H'$ is the budget line if the entire cash transfers are saved.
2008; Paulus et al. 2010). For example, the share of in-kind benefits relative to total aid in the U.S. is about 60 percent, which is 10 to 20 percentage points lower than the shares in most European countries (Marical et al. 2006). Persson and Tabellini (1999) and Persson et al. (2000) have suggested that the presidential-congressional system of the United States—as opposed to the European parliamentary regime—promotes intense competition between both voters and politicians for redistributive transfers, leading to a more targeted redistribution. Intuitively, separation of powers in the presidential-congressional regime reduces the scope of collusion among politicians, leading to less redistribution and less Leviathan rents (Persson et al. 2000).\footnote{On the contrary, a high level of legislative cohesion in a parliamentary regime implies that redistribution goes to a broader constituency, and politicians earn more rents.}

This competitive nature of the political institution in the United States, given the limited size of redistributive pie, disciplines the government to restrain the moral hazard associated with a hidden saving problem. Thus, our results are consistent with previous findings that in-kind transfers, such as health care and public housing, are more targeted toward the poor and the unemployed in the U.S. than in many European countries (Paulus et al. 2010; Marical et al. 2006). Overall, the share of in-kind transfers differs across demographic groups and across political regimes to the extent that they influence the allocative efficiency.

In this paper, we have offered a simple two-period economy with two types of transfers and two types of agents. The unemployed agent has a moral hazard problem—associated with informational asymmetry on the effort level—and a hidden saving problem—driven by saving technology for cash transfers. We characterize the incentive-constrained efficient allocation, in which the marginal rates of substitution between cash and in-kind transfers differ across the population. (In the working paper version of this paper, we show that a proper mixture of taxation and subsidization exists to decentralize the constrained effi-
cient allocation.) Our results indicate that publicly providing in-kind transfers can be justified on the grounds of economic efficiency.

References


A Appendix

A.1 First-order Conditions for the Planner’s Problem in (7)

The first-order conditions are:

\[ x_u : \beta u'(x_u) + \mu \lambda_H u''(x_u) + \mu \lambda_L u''(x_u - \sigma_L) + \mu \alpha [u'(x_u) - u'(x_u - \sigma_L)] = \mu p_x \]  
\( (A1) \)

\[ X_u(s) : \beta U'(X_u(s))P(s|e_H) - \mu \lambda_H U''(X_u(s))P(s|e_H) - \mu \lambda_L U''(X_u(s) + \sigma_L)P(s|e_L) + \mu \alpha [U'(X_u(s))P(s|e_H) - U'(X_u(s) + \sigma_L)P(s|e_L)] = \mu p_x P(s|e_H) \]  
\( (A2) \)

\[ y_u : \beta v'(y_u) = \mu p_y \]  
\( (A3) \)

\[ Y_u(s) : \beta V'(Y_u(s))P(s|e_H) = \mu p_y P(s|e_H) + \mu \alpha V'(Y_u(s))(P(s|e_L) - P(s|e_H)) \]  
\( (A4) \)

\[ x_j : (1 - \beta) u'(x_j) = (1 - \mu)p_x \]  
\( (A5) \)

\[ X_j(s) : (1 - \beta) U'(X_j(s))Q(s) = (1 - \mu)p_x Q(s) \]  
\( (A6) \)

\[ y_j : (1 - \beta) v'(y_j) = (1 - \mu)p_y \]  
\( (A7) \)

\[ Y_j(s) : (1 - \beta) V'(Y_j(s))Q(s) = (1 - \mu)p_y Q(s) \]  
\( (A8) \)

A.2 Proofs for Propositions 1 through 5

Proof of Proposition 1: Equations (A1) and (A2) imply (i) \( u'(x_u) \neq U'(X_u(s)) \) unless all the multipliers—\( \lambda_H, \lambda_L, \) and \( \alpha \)—are zero. In Proposition 3, however, we show that \( \alpha > 0. \) (The result of Proposition 3 does not depend on Proposition 1 (i).) To derive (ii), substitute (A3) into (A4), and note that \( v'(y_u) \neq V'(Y_u(s)) \) as long as \( P(s|e_H) \neq P(s|e_L). \) It is readily seen from (A5) and (A6) that (iii) \( u'(x_j) = U'(X_j(s)) \). Similarly, (A7) and (A8) imply (iv) \( v'(y_j) = V'(Y_j(s)). \)

Proof of Proposition 2: We first prove that the multipliers for Euler equations (2) and (3) are zero.
Lemma 1 \( \lambda_H = \lambda_L = 0 \).

Proof. Summing up (A2) over \( s \in \{f, n\} \), we derive

\[
\beta \sum_s U'(X_u(s))P(s|e_H) - \mu \lambda_H \sum_s U''(X_u(s))P(s|e_H) - \mu \lambda_L \sum_s U''(X_u(s) + \sigma L)P(s|e_L) \\
+ \mu \alpha \left[ \sum_s U'(X_u(s))P(s|e_H) - \sum_s U'(X_u(s) + \sigma L)P(s|e_L) \right] = \mu p_x \sum_s P(s|e_H)
\]

Applying (2), (3), and \( \sum_s P(s|e_H) = 1 \), we obtain

\[
\beta u'(x_u) - \mu \lambda_H \sum_s U''(X_u(s))P(s|e_H) - \mu \lambda_L \sum_s U''(X_u(s) + \sigma L)P(s|e_L) \\
+ \mu \alpha [u'(x_u) - u'(x_u - \sigma L)] = \mu p_x
\]

Comparing the above equation with (A1), we conclude that \( \lambda_H = 0 \) and \( \lambda_L = 0 \) since both \( u''(\cdot) \) and \( U''(\cdot) \) are negative.

Comment: A positive multiplier typically implies a binding constraint. A binding constraint, however, does not necessarily imply a positive multiplier. Our model is a special case in which a binding constraint has a zero multiplier. A similar phenomenon occurs in Chien and Song (2013) and Ábrahám et al. (2011). Intuitively, zero shadow values do not mean that saving constraints are meaningless. The planner would want to change \( \sigma \) if she could—that is, the planner wants to live in a parallel universe in which agents cannot save. This change would eventually reduce the agent’s utility. However, this reduction would be made possible by either the increase or the decrease in \( \sigma \). The effects of an increase or decrease have identical magnitude, but in the opposite directions. Thus, shadow values become zero, although the constraints are still binding.

Substituting Lemma 1 into (A1) and (A2), we derive (8) and (9).

Proof of Proposition 3: First, it is readily seen from (9) that \( \alpha \) and \( p_x \) cannot be zero at the same time. Otherwise, (9) becomes ‘0 = \( \beta \frac{\sigma}{\mu} \)’—a contradiction.

Next, suppose \( \alpha = 0 \), implying that \( X_u(s) \) is a constant. This means that transfer payments from government does not depend on state \( s \). Also note that
\(Y(s)\) does not depend on \(s\) if \(\alpha = 0\). Then the unemployed agent does not have any incentive to make high effort—a contradiction.

Finally, suppose \(p_x = 0\). Since this implies that the shadow value of \(x\) is zero, extra resource does not increase welfare. However, if we channel extra resource to the employed (who does not have the moral hazard problem), the welfare clearly increases. The same logic shows \(p_y > 0\).

**Proof of Proposition 4:** Suppose \(\sigma_L \leq 0\). Then, (8) and (9) imply:

\[
\frac{p_x}{u'(x_u)} = \frac{\beta}{\mu} + \alpha \left(1 - \frac{u'(x_u - \sigma_L)}{u'(x_u)}\right) > \frac{\beta}{\mu} \geq \mathbb{E}\left(\frac{p_x}{U'(X_u(s))}\right)
\]

since \(u'(x_u) > u'(x_u - \sigma_L)\) and \(U'(X_u(s)) < U'(X_u(s) + \sigma_L)\).

Then, by Jensen’s inequality,

\[
\frac{p_x}{u'(x_u)} > \mathbb{E}\left(\frac{p_x}{U'(X_u(s))}\right) > \frac{p_x}{\mathbb{E}(U'(X_u(s)))} \Rightarrow u'(x_u) < \mathbb{E}(U'(X_u(s))).
\]

Because this contradicts constraint (2), we conclude that \(\sigma_L > 0\).

**Proof of Proposition 5:** Dividing (A1) by (A3) and dividing (A5) by (A7), and using Lemma 1, we derive:

\[
\frac{u'(x_u)}{v'(y_u)} \left[1 + \frac{\mu}{\beta} \alpha \left(1 - \frac{u'(x_u - \sigma_L)}{u'(x_u)}\right)\right] = \frac{p_x}{p_y} = \frac{u'(x_j)}{v'(y_j)}.
\]

Since \(\sigma_L > 0\) from Proposition 4, the result in (11) follows.
Figure 1: Consumption Choices under Cash and In-Kind Transfers with Hidden Saving Problem