Welfare and Paternalism

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Abstract

Citizens' desires to assist the poor reflect a mixture of insurance motives, altruism, and paternalism. Consequently, government policies toward the poor have always been a mixture of income supports and regulations of recipient behavior. Unfortunately, there have been very few analyses of the how these distinct motives interact to generate various policies to the poor. In this paper, we develop such a model where a political decisionmaker has policy preferences generated from a mixture of considerations include social insurance, altruism, and paternalism. The decisionmaker's ability to pursue these goals, however, is constrained by the moral hazard and adverse selection inherent in income support policies.

1   Introduction

Debates on welfare have long centered on the effects of its cash transfers and administration on the behavior of the poor. Critics from both the right and left have criticized American welfare policy on these grounds. Conservatives such as Charles Murray (1984) have argued that U.S. welfare programs

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create incentives that are deleterious to the work ethic and the two-parent family structure. Scholars of the left such as Frances Fox Piven and Richard Cloward (1971) have argued that welfare programs are designed to "regulate the poor" and stave off urban unrest.

While the left and right have focused on the negative behavioral effects of welfare, a group of social policy scholars and politicians have began to stress the possibility of positive behavioral responses that can be fostered by properly designed welfare programs (see Mead 1997 and 2004). These "new paternalists" argues that government can and should use public support programs to promote certain behaviors such as work and marriage while discouraging others such as out-of-wedlock births and substance abuse. To accomplish these goals, paternalists argue that welfare should not be an entitlement. Rather recipients must accept a certain set of conditions in exchange for assistance and must maintain certain behaviors while enrolled in the program. According to the advocates, these requirements are intended to improve the economic, social, and civic capacities of the recipient.

Paternalist arguments were very prominent in the welfare reform movement that culminated in Bill Clinton signing the Personal Responsibility and Work Opportunity ACT (PRWORA) in 1996. Beginning in the early 1990s, governors of both political parties began to request and receive waivers to federal policies under Aid to Families with Dependent Children (AFDC). Under these waivers, states began to use welfare as leverage to enforce work requirements and school attendance and discourage out-of-wedlock births while placing time limits on assistance.[1] The political popularity and apparent success of these state initiatives increased pressure and support for comprehensive reform that would incorporate these elements.

PRWORA had five major features:

1. It abolished AFDC and created the Temporary Assistance to Needy Families (TANF) program which replaced the federal entitlement to

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[1]For a thorough history and analysis of welfare reform politics, see Weaver (2000).

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welfare with a block grant to state governments.

2. States were given greater flexibility to determine how the TANF grants would be spent.

3. TANF contained strict work requirements on individuals and states. Individuals became subject to sanctions for violating these requirements.

4. TANF contained a five year time limit for cash benefits paid for by federal dollars. At their discretion, state can spend their own money on individuals who have exceeded the time limit.

Perhaps the most consequential implication of these changes was that welfare benefits would no longer be an entitlement and that states were permitted (indeed required) to condition aid on the recipients willingness to work.[2]

Needless to say, the paternalistic approach to welfare and poverty has been highly controversial. Critics see the new paternalism less as a third-way between liberalism and libertarianism than as a more politically-attractive program for welfare retrenchment. They argue that paternalist measures are not designed to help the poor and enable them to conform better to their own values. Rather, they suggest paternalism is designed to save money by driving the most politically-attractive recipients from the welfare roles so that welfare becomes a program only for the "undeserving poor." Moreover, paternalism is not about facilitating the expression of the poor's values but imposing those of the majority. Critics also charge that the presumptions about the poor underlying paternalistic proposals are driven more by racial and gender biases than by an accurate understanding of the roots of poverty.

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[2]Paternalist arguments also played an important role in the reauthorization of TANF in 2006 when the work requirements on states were stiffened The legislation added other paternalist measures such as grants to states for marriage promotion. and mandatory drug testing for all TANF recipients.

In this paper, we wish to contribute to this debate by developing a model of the structure and benefits of a welfare program designed by a paternalistic policymaker. We intend the model to closely mirror the paternalists' understanding of their own project. We do this, however, not because we necessary agree with all of their premises and conclusions. Rather we believe that a fully explicated model of paternalistic policy making is a first step for evaluating the importance of paternalistic ideas in the formation of welfare policy in the U.S. and elsewhere. Such a model will facilitate empirical tests that can distinguish true paternalistic justifications "that the person interfered with will be better off or protected from harm" against alternative explanations based on racial and gender bias, animus towards the poor, or fiscal conservatism.[3]

The paper proceeds as follows. First, we review related models of redistribution and social insurance as well as empirical work on the role of paternalism in state welfare policy choices. Then we describe our basic model and solve for two special cases. The first is the case where there is no moral hazard in the welfare system and the second is the case where there is moral hazard, but the policymaker has no paternalistic preferences. We then analyze how paternalistic preferences affect the structure of welfare programs and benefit levels. The model identifies important qualitatively different roles of paternalism. In cases where paternalistic preferences are low, paternalism enables the policymaker to solve moral hazard problems. For policy makers with stronger paternalistic preferences, welfare programs are designed to encourage participation by the poor to induce better behavior. For both of these cases, we analyze how policy responds to the political and economic fundamentals of the model. We then discuss various extensions of the model including the role of altruism and costly implementation.

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[3]The quoted definition of paternalism is from Dworkin (2005).

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2   Related Literature

Our model is closely related to standard political economy models of redistribution and social insurance. But there are several important differences. In purely redistributive models such as Meltzer and Richard (1981), voters seeks to maximize current income with perfect information about their own productivity and the distribution of productivity in society. Unlike our model where citizens care about how social benefits affect a broad range of behaviors, voters in the standard redistributive model only care about how taxes and benefits affect the tax base through labor supply. A key result of these models is that voters' preferred tax rates are a decreasing function of their own income and an increasing function of average income. As long as paternalistic preferences are not too strong, this implication holds for our policymaker as well. Our model also predicts that income inequality should produce greater levels of taxes and benefits.

In that the policymaker in our model is uncertain about her income, though not about the distribution of incomes, our model is similar to models of social insurance such as those developed by Moene and Wallerstein (2001, 2003). In these models, social spending not only redistributes income but also provides insurance against economic risks. In the Moene and Wallerstein models, voters choose both the income transfer that citizens receive when unemployed and the taxes needed to pay for these benefits. Given standard assumptions about preferences for risk, an increase in the gap between the pre-benefit income of the unemployed and the income of an employed worker increases leads the employed worker to demand more insurance in the form of unemployment benefits. Similarly, in our model, an increase in the wage gap between high- and low-productivity works generates greater demands for redistribution. In the Moene and Wallerstein models, however, a mean-preserving spread of wages reduces the gap between the incomes of the unemployed and those with wages below the mean. This in turn leads to a decline in the demand for social insurance and a lower preferred tax rate.

But in our model, generally there is no unemployment. Low wage workers contribute at least some labor to the market. Consequently, the effect of wage inequality in our model is quite different and more closely parallels the results of the redistributive models. In both the standard redistribution and social insurance models, voters (and therefore policymakers) care only about their expected incomes. Consequently, they leave little room for considerations like paternalism.

The standard models also do not focus on the design of transfer programs. In the Melzer-Richard model, every citizen receives a lump sum transfer. In the Moene-Wallerstein models, all unemployed receive a transfer, but unemployment is exogenous and perfectly observable. Besley and Coate (1992) does take the structure of transfer programs seriously as they explicitly incorporate work requirements and income exemptions in a model of social transfers. A major difference between their work and ours are the motivations of the policymaker. In their model, the policymaker wants only to maintain a minimum income at the lowest cost. Therefore, the only role for program features such as work requirements and income set asides is to screen out highly productive works who might otherwise shirk and seek welfare. In our model, the policymaker is a representative agent who is uncertain about her productivity. She may also have paternalistic preferences about the behavior of the poor.

We also believe our model can usefully contribute to empirical work on welfare policy choices. There is a large literature on the level of benefits across states under AFDC.[4] A very large number of factors have been shown to correlate with state-level AFDC benefits. These include political liberalism, mobilization of the poor, the racial composition of the welfare rolls, and partisan political competition. An extension of our model that incorporates (possibly negative) altruism can incorporate liberalism, mobilization of the

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[4]States had the most discretion over the level of cash benefits and considerably less on other dimensions of program design.

poor, and the racial composition of (potential) beneficiaries. We leave an extension incorporating partisan competition to future work.

Since the passage of PRWORA, the focus of empirical research on welfare reform has shifted away from a simple focus on benefits towards understanding the myriad of choices that states have made about work requirements, time limits and other restrictions on benefits eligibility. In a widely-cited paper, Soss et al (2001) analyzes variation in "the rules and penalties that condition access to resources and structure the treatment that citizens receive in government programs." Similar to the literature on AFDC benefits, their most consistent finding is that states whose welfare caseloads contains higher percentages of African-Americans choose stronger sanctions for non-compliance, stricter time limits, and are more likely to impose family caps. The racial composition of the caseload, however, had no significant effect on the stringency of work requirements. Unfortunately, the study includes only three extremely questionable indicators for paternalism: the unmarried birth rate, the per capita caseload, and the incarceration rate.[5] The unmarried birth rate is positively correlated only with the strength of sanctions while per capita caseload is negatively associated only with the strength of sanction. Surprisingly illegitimacy is not related to the adoption of a family cap that denies benefits to mothers who have additional children while on welfare.

While the paper reveals several interesting empirical patterns, it has a number of limitations with respect to a full analysis of the effects of paternalism. First of all, as our model suggests, benefit rates and behavior requirements are jointly determined. Soss et al present no results on the link between benefit levels and behavioral requirements, although they mention in a footnote that in some specifications they included AFDC benefits as a control but it was insignificant. Second, the measures of paternalistic prefer-

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[5]The authors include the incarceration rate to test Piven and Cloward's (1972) hypothesis that welfare programs are designed to regulate the poor.

ences are crude. Incarceration rates may capture one aspect of paternalism (a concern for deviance and a willingness to punish), but other related public attitudes are not controlled for.

Gais and Weaver (2002) also study the structure of state policies under TANF. Like Soss et al, they include only out-of-wedlock birth rates and measures of welfare dependency to control for paternalistic motives. They find that states with high levels of welfare dependency have more generous time limits, but there is no correlation between dependency and benefits severity of sanctions, family caps, or immediate activity requirements (get a job in less than 24 months). The non-marital birth rate is not correlated with any of their measures.

In a more recent paper, Fellows and Rowe (2004) study the strictness of eligibility, flexibility of work requirements, and generosity of benefits across states under TANF. They develop additive scales for eligibility and flexibility. Their results confirm the Soss et al's results on the effects of the racial make-up of a state's caseload. More African-Americans on TANF increases the strictness of eligibility and decreases flexibility of work rules. The percentage of Latinos, however, is associated with less strict eligibility. Public and government liberalism are associated with less stringent eligibility and greater flexibility while high income voting participation has the opposite effects. Like Soss et al, they use the unmarried birth rate and the caseload to measure paternalistic demands. But they find that these measures soften eligibility requirements suggesting a paternalistic desire to increase participation in TANF. Though the results are less precisely estimated, the paternalistic measures are also associated with more flexible work requirements.

Unlike Soss et al, Fellows and Rowe do examine variation in TANF benefit levels (though they do not consider that they are jointly determined with eligibility rules). The percentage of African American and Latinos decrease cash benefits for a family of three. Public liberalism and democrats in the

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legislature increase benefits, but so does high income representation and gross state product. States with higher caseloads pay high benefits, but there is no significant effect of the unwed birth rate.

To summarize, the currently empirical literature suffers from at least to important limitations in estimating the effect of paternalism on welfare policy choices. The first is that the measures for paternalistic demands are limited only to a few measures of policy outcomes under AFDC that paternalists criticized: burgeoning dependency and illegitimacy. The argument that they are exogenous to TANF policies because they were "predetermined" under AFDC is not compelling. Any number of factors might jointly determine dependency, out-of-wedlock births, and policy. Other measures such as public attitudes suffer from similar problems. It is doubtful that there are any truly exogenous instruments. The second problem is that the existing literature estimates the relationship of a set of variables to each policy choice in isolation without understanding the ways that benefit levels, eligibility rules, and behavioral regulation interact. We hope that a formal model such as the one presented here can both be useful in interpreting the correlations in the literature as well as suggesting new avenues for empirical work.

3   The Model

Society consists of a continuum of workers. Workers may earn market income by supplying labor in return for a fixed wage. Individuals differ with respect to the marginal productivity of their labor. We assume that there are productivity types θ_H and θ_L. Productivity type θ_H receives a wage w per unit of labor and type θ_L receives δw where $\delta \in [0, 1)$. Obviously, δ measures the extent of wage (and productivity) inequality in the economy. We assume that each worker's productivity is drawn randomly and the probability of high productivity and wages is ρ and the probability of low productivity and wages is $1 - \rho$. Because there is a continuum of individuals, these reflect

the population proportions. To conserve notation, it is convenient to define $\gamma = \frac{\rho}{1-p}$ as the ratio of high-skilled to low-skilled workers.

For reasons developed below, society may create institutions that supplement the income of low-wage workers.[6] Although there is a long history of private provision of social protection (also motivated by insurance, altruism, and paternalism), we focus on government policies. We assume that a political decision maker designs a public welfare system that provides a cash benefit b to citizens who meet both eligibility and behavioral requirements. The first requirement is a means test. Ideally, the policymaker would want the potential recipient to document that she is indeed type θ_L or draws a wage of only δw. We assume, however, that such information is unverifiable and that the policymaker can condition only upon earned income R.[7] In establishing this means test, the policymaker establishes an income cutoff z such that only applicants with $R \leq z$ are eligible for the cash benefit. The second eligibility requirement is that the applicant submit to some form behavioral regulation. Here we model such regulation as the participation in activities such as job training, drug treatment, parenting classes, and supervised employment. As a shorthand consistent with much of emphasis of contemporary paternalistic approaches to welfare, we refer to these requirements throughout as "work requirements", and represent them as a c units of labor that a welfare recipient must expend. The only compensation for this labor is the cash welfare benefit. Finally, we assume that the program is funded by a linear tax t on earned income and that the budget must be balanced. For simplicity, we assume that there is no dead-weight loss to taxation. Our choice of utility function below rules out a direct labor market distortion from taxes, but of course, the benefit levels and eligibility requirements affect labor supply.

To summarize, welfare policy and labor supply decisions are determined

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[6] In our two type model, the government cannot supplement the incomes of all workers because the incomes of high-wage workers are higher than average income.

[7] The assumption that market income but not wages are verifiable obviously requires that hours worked is also unverifiable.

in the following sequence.

1. The policymaker chooses the welfare system (t, z, c).

2. Productivity levels and wages are drawn for each individual.

3. Each individual chooses her labor supply, and earns her pre-tax income. Those who earn income less than or equal to z choose whether or not to accept welfare. An individual that accepts welfare supplies an additional c units of (unproductive) labor.

4. Let W the proportion of individuals who accepted welfare, the government pays a cash benefit $b = \frac{R}{W}$ to each person who accepted welfare at the previous stage.

3.1 Payoffs

We assume that each individual gets payoff

$$\ln(m) - l + \mu \bar{c}$$

where m is her money income net of taxes and transfers, l is her total labor supply which includes both market labor and effort expended in meeting the work requirements. The remaining term μc reflects a paternalistic benefit that the individual derives from having the poor participate in the work requirements and/or submit to other forms of behavioral regulation where $\bar{c}$ in this case stands for the average amount of labor the poor devote to these requirements. We assume that $1 > \mu \geq 0$ so that citizens derive a positive benefit from the work requirements but that a poor citizen prefers leisure to meeting the requirement. Consequently, all citizens individually prefer to set her own c to 0 but that $c > 0$ for other poor citizens. Thus, c is a public good

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with free riding.[8] Below we discuss a number of possible interpretations of μ.

Consider the labor supply of a citizen who does not receive benefits. Such an individual maximizes $\ln(1-t)wl-l$ so that $l^* = 1$. Note that the wage and tax elasticities for non-welfare recipients are zero. Although this assumption is restrictive, empirical work finds that such elasticities are small for full time workers. But more importantly, it allows us to put all of the analytic focus on the phenomenon of most interest here–i.e. the interaction between benefits and work requirements.

Finally, we allow for the possibility that the policy maker's ex-ante likelihood of earning a high wage is $\hat{\rho}$, which may or may not equal ρ. Separating ρ from $\hat{\rho}$ allows us to model the consequences of different levels of representation of the two income groups in politics, and may allow us to model the outcomes of party competition in future research.

4   Equilibrium

We restrict attention to perfect Bayesian equilibria in which only low-wage workers accept welfare. In such an equilibrium, a set of incentive constraints must be satisfied. First, high-wage workers must prefer the income and hours workers outside the program to the income, hours worked, and behavioral regulation associated with welfare benefits. Second, low-wage workers must prefer the conditions of program participation to the income and labor provide outside the program.

To characterize these constraints, let $U(\omega, t, z) - c$ be the utility of a citizen with wage $\omega \in \{\delta w, w\}$ from participation in the welfare program

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[8]Such an interpretation is consistent with the behavioral presumptions of many paternalists. For example, Mead (2004) argues that the poor share the values of mainstream society but fail to internalize them in early life due to poor parenting and disorganized family lives. So the poor may appreciate the social value of c but find it costly to personally conform.

at a given tax rate and income threshold. As indicated above, the utility of non-participation is $\ln((1-t)\omega) - 1$. Therefore, the incentive constraint for high-skilled workers is

$$U(w,t,z) - c \leq \ln((1-t)w) - 1 \tag{ICH}$$

and the constraint for low skilled workers is

$$U(\delta w, t, z) - c \leq \ln((1-t)\delta w) - 1. \tag{ICL}$$

In general, the function $U(\omega, t, z)$ depends on whether the value of the income cutoff z is set sufficiently low to constrain the market labor supply of each type of worker. If the income cutoff constraint does not bind, the optimal labor supply of a citizen on welfare is $l^* = 1 - \frac{B}{\omega}$ where B is the cash benefit. Consequently, $U(\omega, t, z) = \ln((1-t)\omega(1 - \frac{B}{\omega}) + B) - 1 - \frac{B}{\omega}$. If the income constraint binds, however, earned income on welfare is z and the market labor supply is $\frac{z}{\omega}$. Therefore, $U(\omega, t, z) = \ln((1-t)z + B) - \frac{z}{\omega}$.

For expositional purposes, we focus on the case where z is sufficiently low that it represents a binding constraint on any welfare participant. Lemma 1 in the appendix proves that the policymaker does not leave slack in this constraint in equilibrium.

So in a separating equilibrium, the labor supply of high-wage workers maximizes their utility from participating exclusively in the labor market. Alternatively, each low-wage worker supplies $\frac{z}{\delta w}$ units of labor in order to qualify for welfare. Given these market labor supplies, the total revenue of the government is $t(\rho w + (1-\rho)z)$ and the per capita payment to welfare recipients is $t\gamma w + tz$. Consequently, the after-tax and transfer income of an individual who collects welfare is

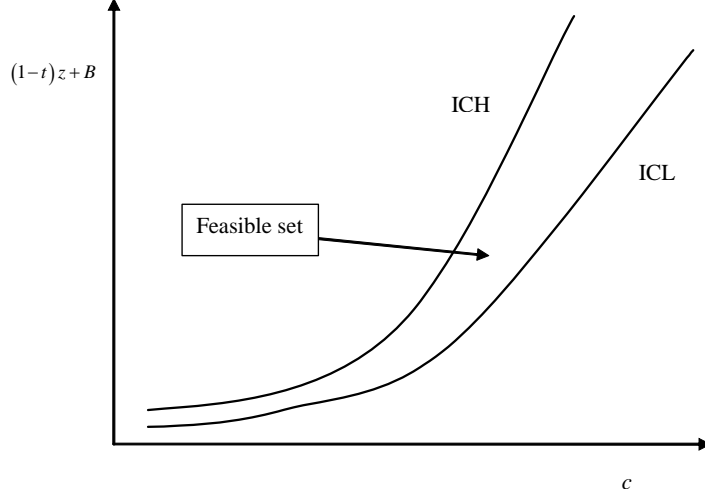$$(1-t)z + t\gamma w + tz = z + t\gamma w.$$

Figure 1: Incentive Constraints

Now we can write the ICH and ICL conditions as follows

$$\ln\left(z + t\gamma w\right) - \frac{z}{w} - c \leq \ln\left((1-t)w\right) - 1 \tag{1}$$

and

$$\ln\left(z + t\gamma w\right) - \frac{z}{\delta w} - c \geq \ln\left((1-t)\delta w\right) - 1. \tag{2}$$

Lemma 2 in the appendix proves that both of the constraints can be satisfied by some c for all $z > 0$ and $t \in [0, 1]$.

Figure 1 plots these constraints as a function of $(1 - t)z + B$ and c. In the regions above each constraint i.e. those with higher incomes and lower work requirements, the citizen prefers welfare. So in any separating equilibrium, the combination of program incomes and work requirements must fall between the two loci.

Given that the policymaker represents constituents who are high-wage with probability $\hat{\rho}$, her objective function is

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$$\hat{\rho} \left[\ln \left((1 - t)w\right) - 1\right] + (1 - \hat{\rho}) \left[\ln \left(z + t\gamma w\right) - \frac{z}{\delta w} - c\right] + \mu c.$$

In the separating equilibrium, her choices of t, z, and c must satisfy ICH and ICL which can be re-written as follows

$$\ln \left(z + t\gamma w\right) - \frac{z}{w} - \left[\ln \left((1 - t)w\right) - 1\right] \leq c \leq$$
$$\ln \left(z + t\gamma w\right) - \frac{z}{\delta w} - \left[\ln \left((1 - t)\delta w\right) - 1\right].$$

That the policymaker's objective function is linear in c simplifies the analysis. If $\mu > 1 - \hat{\rho}$, the policymaker wants to maximize the work requirements subject to the incentive constraints. Consequently, the ICL holds as the policymaker chooses as large a work requirement as possible without driving low-skilled citizens off welfare. Here paternalism is the dominant motivation. Indeed as we will see, the policymaker may even increase taxes and benefits in order to encourage recipients to accept a great degree of behavioral regulation. So we refer to this scenario as the *regulatory regime*

If $\mu < 1 - \hat{\rho}$, however, the policymaker prefers to reduce the work requirements as low as permitted by the incentive constraints. Here the concern is that too few work requirements encourage high-skilled citizens to enroll in welfare. So the binding constraint is the ICH. We call this the *insurance regime* as the principal motivation of work requirements is to avoid adverse selection problems so that higher benefits can be sustained for the truly needy. But before turning to these two regimes, we consider a baseline case where wages are observable so that there no incentive problems and the policymaker has no preference for paternalism.

4.1 Baseline Cases

In this section, we consider two baseline cases. In the first scenario, we consider the implications of observable wages. In this setting, only low wage

workers are eligible for welfare. Consequently, there are no selection problems, and the policymaker can design a pure insurance scheme.

In the second scenario, we assume that the policymaker does not have paternalistic preferences so that the only role of work requirements is screening. This model is a special case of Besley and Coate (1991). But our results diverge from theirs in important ways. In our model, work requirements are costly to the policymaker (because she internalizes some of the effect on low-wage earners utility). Consequently, in equilibrium, the policymaker relies solely on benefit levels for screening purposes.

4.1.1 Observable Productivity

In the baseline case where productivity and wage rates are observable, the policymaker has no reason to distort the labor supply of low wage workers on welfare. So she sets z at a level that does not bind, and low wage workers choose their optimal labor supply given the benefit, $l^* = 1 - t\frac{\gamma}{\delta}$. With observable skill levels and no paternalistic preferences, the policymaker sets $c = 0$.

Thus, the policymaker maximizes

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\begin{aligned}
&\hat{\rho}\left[\ln\left((1-t)w\right) - 1\right] \\
&\quad + (1-\hat{\rho})\left[\ln\left(w\delta\left(1-t\frac{\gamma}{\delta}\right) + t\gamma w\right) - \left(1 - t\frac{\gamma}{\delta}\right)\right] \\
&= \hat{\rho}\left[\ln\left((1-t)w\right) - 1\right] + (1-\hat{\rho})\left[\ln\left(w\delta\right) - \left(1 - t\frac{\gamma}{\delta}\right)\right]
\end{aligned}
$$

Solving for the optimal tax rate, we find that

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t^o = \max\left\{0, 1 - \frac{\delta\hat{\rho}}{\gamma(1-\hat{\rho})}\right\}.
$$

A few observations about the interior solution.

1. The equilibrium tax rate is positive if $\hat{\rho} < \frac{\gamma}{\delta+\gamma}$.

2. The equilibrium tax rate decreases in the policymaker's ex ante probability of being high skilled $\widehat{\rho}$.

3. The equilibrium tax rate increases in the ratio of high-skilled to low-skilled workers γ.

4. The equilibrium tax rate decreases as the wage gap between skill levels decreases (i.e. δ increases).

Despite the fact that our model is one of social insurance, the predictions of the baseline case hew closely to those of the canonical models of redistribution such as Meltzer and Richard (1981). The preferred tax rate declines in the policymaker's income and increases in aggregate income. The tax rate increases in the level of inequality (as reflected in δ) but this is due to an insurance effect not majority rule aggregation. These results differ from the social insurance models of Moene and Wallerstein (2001 ,2003) and Iverson and Soskice (2001) which predict that income inequality produces higher taxes and benefits.

4.1.2   No Paternalism

In this case the policymaker maximizes

$$\hat{\rho} \left[\ln \left((1-t)w \right) - 1 \right] + (1-\hat{\rho}) \left[\ln \left(z + t\gamma w \right) - \frac{z}{\delta w} - c \right]$$

subject to the ICH and $c \geq 0$. The solutions for t and z are

$$t^n = 1 - \frac{\delta \left(\hat{\rho} + \lambda^n \right)}{\gamma \left(1 - \hat{\rho} - \delta \lambda^n \right)}$$

$$z^n = w \left[\frac{\delta}{1 - \hat{\rho} - \delta \lambda^n} - \gamma \right]$$

where $\lambda^n \geq 0$ is the Lagrange multiplier for ICH and its solution is defined implicitly as
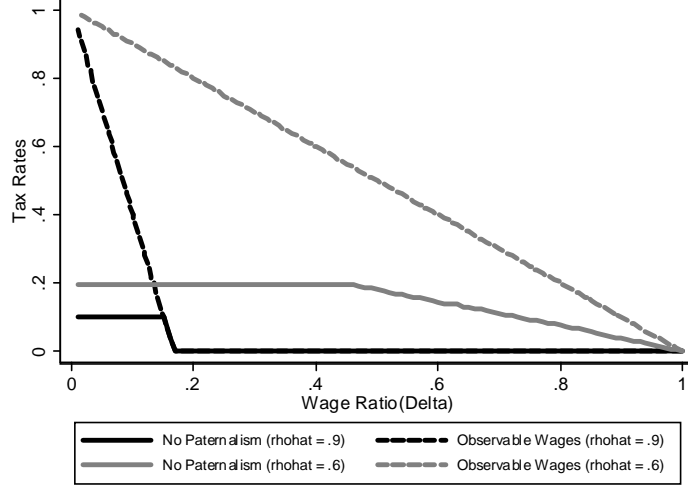
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Figure 2: Tax Rates and Wage Ratios

$$\ln\left[\frac{(\hat{\rho}+\lambda^n)}{\gamma\left(1-\hat{\rho}-\lambda^n\right)}\right] = 1 - \frac{1}{1-\hat{\rho}-\delta\lambda^n} + \frac{\gamma}{\delta}$$

Proposition 1 *In the baseline case of $\mu = 0$, the optimal work requirement is zero i.e. $c^n = 0$.*

In the special case where the ICH does not bind, $\lambda^n = 0$ and

$$t^n = t^o = 1 - \frac{\delta\hat{\rho}}{\gamma\left(1-\hat{\rho}\right)}$$

$$z^n = z^o = w\left[\frac{\delta}{1-\hat{\rho}} - \gamma\right].$$

For the more general case where the ICH does bind, figure 2 demonstrates how t^n varies with δ and $\hat{\rho}$.
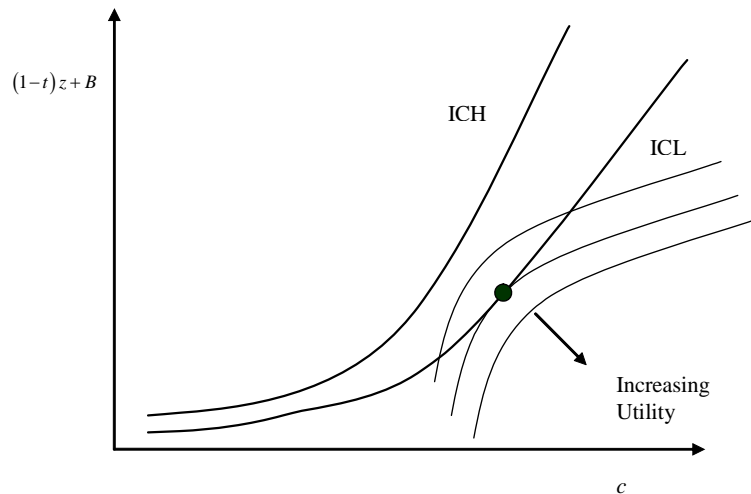
Figure 3: Equilibrium in Regulatory Regime

5 The Regulatory Regime

In the regulatory regime, the primary objective of the policymaker is to encourage low-skilled workers to accept as extensive a set of behavioral regulations as possible. Benefit levels and earned income caps are primarily tools to make a highly regulatory welfare system attractive. Consequently, the binding constraint on the policymaker is the ICL.

The logic of the equilibrium in this regime is illustrated in figure 3. The figure reproduces the constraints set from figure 1, but now indifference curves for the policymaker are superimposed. In the case illustrated, the policymaker's utility increases in the direction of smaller incomes for welfare recipients but larger work requirements. In equilibrium, the policymaker maximizes her utility by choosing the combination of z, B, and c that satisfies the ICL.

To get some additional intuition for the equilibrium in this regime, assume

that the non-negativity constraint on c does not bind. Therefore, we can substitute ICL into the policymaker's objective to obtain

$$\hat{\rho} \left[\ln \left((1-t)w \right) - 1 \right] + (1-\hat{\rho}) \left[\ln \left((1-t)\delta w \right) - 1 \right] +$$
$$\mu \left[\ln \left(z + t\gamma w \right) - \frac{z}{\delta w} - \ln \left((1-t)\delta w \right) + 1 \right]$$

which is maximized with respect to the tax rate and income threshold.

Before presenting the full solution, we can get some intuition about the qualities of equilibrium in this regime by slightly rewriting **??** as

$$(1-\mu) \left(\ln \left((1-t)w \right) - 1 \right) + (1-\hat{\rho}) \ln \left(\delta \right) + \mu \left[\ln \left(z + t\gamma w \right) - \frac{z}{\delta w} \right].$$

The first important implication is that the expected income of the policymaker's constituents $\hat{\rho}$ appears only in a term without any policy variables. Consequently, equilibrium policy is completely independent of $\hat{\rho}$. This reflects the lack of any insurance motivation. The system is not designed to redistribute income across income classes, but only to encourage low income citizens to subscribe to paternalistic policies.

Second, the objective function is a weighted average of utilities across high- and low-wage workers. But the weights are given by μ, not by the probability that the policymaker's constituents receives each income. When μ is high, greater weight is placed on the income that low-wage types receive on welfare. Consequently, when paternalistic preferences are high, the policymaker is willing to increase benefits to recipients. But this is done to encourage them to accept behavioral regulation, not because of altruism.

Third, note that the income cutoff z appears only in a term representing the poor's utility on the program net of work requirements. Consequently, the optimal z maximizes this utility. Moreover, this suggests that the optimal z is equal to the optimal income of a poor recipient on the program. So z binds the high-wage citizens as much as possible without reducing low wage earners market income. For fixed t the objective function is uniquely

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maximized at

$$z = \max \{0, w (\delta - t\gamma)\}.$$

The following proposition characterizes the policymaker's optimal choices in the regulatory regime.

Proposition 2 *Suppose $\mu > 1 - \hat{\rho}$. Then there are there exist $\widetilde{\mu}_1$ and $\widetilde{\mu}_2$ such that*

1. If $\mu < \widetilde{\mu}_1$, then $t^* = t^n$, $z^* = z^n$, and $c^* = c^n = 0$.

2. If $\widetilde{\mu}_1 \leq \mu \leq \widetilde{\mu}_2$, then $t = 1 - \frac{\delta}{\gamma}\frac{1-\mu}{\mu}$ and $z = w \left(\frac{\delta}{\mu} - \gamma \right)$, and $c^* = \ln \left[\frac{\gamma\mu}{\delta(1-\mu)} \right] + 1 - \frac{1}{\mu} + \frac{\gamma}{\delta}$.

3. If $\widetilde{\mu}_2 < \mu$, then $t = \mu$ and $z = 0$ and $c = \ln \left[\frac{\gamma\mu}{\delta(1-\mu)} \right] + 1$.

5.1 Insurance Regime

In the insurance regime, the binding constraint is the ICH as the policymaker's main concern is that high-wage citizens reduce their labor supply in order to qualify for welfare. But because $\mu < 1 - \widehat{p}$, increasing the work requirement to screen such citizens is costly. Consequently, the policymaker relies more on the income threshold for screening against high-wage individuals. Unlike the regulatory regime where the policymaker wants to maximize work requirements, the policymaker now wants to minimize them subject to screening out high-wage earners. Paternalistic preferences do play an important role, however. Now μ represents the relative cost of screening with work requirements versus screening with income caps.

Figure 4 illustrates how the insurance regime differs from the regulatory regime. Now the policymaker wants to increase welfare payments and reduce work requirements. But she is constrained by the possibility that high-wage worker will enroll in welfare. Consequently, she chooses a point on the ICH that maximizes her utility.
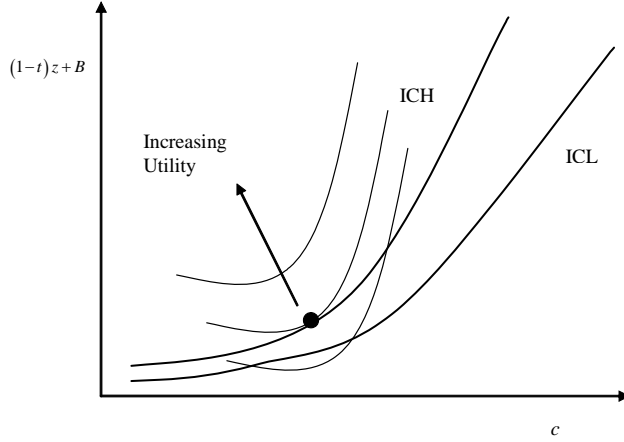
Figure 4: Equilibrium in the Insurance Regime

We can expand this intuition by substituting ICH into the policymaker's objective to obtain

$$(1 - \mu) \left[\ln\left((1 - t)w\right) - 1\right] + \mu \left[\ln\left(z + t\gamma w\right) - \frac{z}{\delta w}\right] - \frac{z}{w}(1 - \hat{\rho} - \mu)\frac{1 - \delta}{\delta}.$$

Like the regulatory regime, the policymaker's objective contains a weighted average of the utilities of participants and non-participants where the weight on non-participant utility is the paternalism parameter. So the paternalism induces behavior similar to altruism. The objective function now, however, contains an additional term reflecting a utility loss associated with increasing the income threshold z. This term reflects the fact that increasing z makes welfare more attractive to the highly skilled. In equilibrium, this effect has to be offset with an increase in the work requirement which is costly to the policymaker. This desire to reduce work requirements on the margin results in a level of z that constrains the labor supply of low wage welfare recipients.

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Now the optimal z for fixed t is

$$z = \max\left\{0, w\left[\frac{\delta\mu}{\delta\mu + (1-\delta)(1-\hat{\rho})} - t\gamma\right]\right\}$$

This is strictly lower than the income low wage welfare recipients would choose if unconstrained $\max\{0, w(\delta - t\gamma)\}$.

A second difference between the regulatory and insurance regimes is that the expected income of the policymaker's constituents matters for policy choice. The main effect is that when the policymaker represents high incomes she prefers a higher income threshold. But when the income threshold is increased, incentive compatibility requires that either work requirements be increased or benefits (and taxes) be decreased. Because increasing work requirements is costly for low μ, the effect is to lower taxes.

Proposition 3 characterizes the solution in the insurance regime.

Proposition 3 *If $\mu < 1 - \hat{\rho}$, then there exist $\widetilde{\mu}_1$ and $\widetilde{\mu}_2$ such that*

1. If $\mu < \widetilde{\mu}_1$, $t^* = t^n$, $z^* = z^n$, and $c^* = c^n = 0$.

2. If $\widetilde{\mu}_1 < \mu \leq \widetilde{\mu}_2$ then

$$t^* = 1 - \frac{(1-\mu)}{\gamma}\frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})}$$

and

$$z^* = w\left[\frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})} - \gamma\right]$$

and

$$c^* = \ln\left(\frac{\mu\gamma}{1-\mu}\right) + 1 + \gamma - \frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})}$$

3. If $\widetilde{\mu}_2 < \mu$, then $t = \mu$ and $z = 0$ and $c^* = \ln\left(\frac{\mu\gamma}{1-\mu}\right) + 1$.

6 Comparative Statics

We turn now to the consideration of how tax rates (and benefit levels), income thresholds, and work requirements vary with the key exogenous parameters of the model. We focus on the case in Propositions 2 and 3 where $\mu > \widetilde{\mu}_1$ so that work requirements are positive in equilibrium. The case of $\mu < \widetilde{\mu}_1$ is identical to the "no paternalism" cases discussed above.

Proposition 4 *The following statements hold in the separating equilibrium at parameters under which welfare is provided:*

- *Tax rates and benefits*

    increase as the degree of paternalism μ increases.

    decrease (weakly) as the policymaker's income increases in the insurance regime.

    are constant in the policymaker's income in regulatory regime.

    are constant in the average wage rate $\overline{w}$.

    increase (weakly) as wage inequality (holding $\overline{w}$ constant) increases.

- *Income eligibility thresholds*

    decrease (weakly) as the degree of paternalism μ increases.

    increase (weakly) as the policymaker's income increases in the insurance regime.

    are constant in the policymaker's income in regulatory regime.

    increase (weakly) as the average wage rate $\overline{w}$ increases.

    decrease as wage inequality (holding $\overline{w}$ constant) increases in regulatory regime.

    responds ambiguously to an increase wage inequality (holding $\overline{w}$ constant) in the insurance regime.

- *Work requirements*

increase as the degree of paternalism μ increases.

decrease (weakly) as the policymaker's income increases in the insurance regime.

are constant in the policymaker's income in regulatory regime.

are constant in the average wage rate $\overline{w}$.

increase (weakly) as wage inequality (holding $\overline{w}$ constant) increases in the insurance regime.

responds ambiguously to an increase wage inequality (holding $\overline{w}$ constant) in the regulatory regime.

Consider first the effects in of the distributive preferences of the policy maker, $\hat{\rho}$. As noted above, taxes and income thresholds are not a function of $\hat{\rho}$ in the regulatory regime because the policymaker's primary motivation is regulation rather than insurance. For the insurance regime, the intuitions about taxes and benefits are also developed above. A policymaker with a higher $\hat{\rho}$ cares more about the utility of the high-wage worker. Such workers are net tax payers, so clearly the tax rate and benefit levels should decline with $\hat{\rho}$. The other effects of variation in $\hat{\rho}$ are less direct. Because a high $\hat{\rho}$ policymaker reduces benefits, low wage welfare recipients want to work more in the market. So long as that labor response does not upset incentives, the policymaker should accommodate with a higher z. Finally, because welfare recipients now get fewer benefits and work more when the policymaker has a high $\hat{\rho}$, there is slack in the ICH that can be eliminated by reducing the work requirement.

Now we consider the effect paternalistic preferences. In both regimes, more paternalism leads to higher equilibrium tax rates. But the intuition is slightly different for each. In the insurance regimes, paternalism makes it less costly to impose work requirements to screen out the highly-skilled. Thus, the policymaker shifts away from a reliance on low benefit levels for screening. Indeed, by making screening cheaper, paternalism moves the outcome closer to the case of observable wages (t^o, z^o, c^o). In the regulation regime, however,

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the policymaker is motivated to increase benefits so that low-skilled citizens tolerate stronger work requirements. This effect actually pushes tax rates higher than t^o. Income thresholds decline in the taste for paternalism in both regimes. Both of these changes are designed to offset the incentive effects of the increase in benefits. In the insurance case, the decrease in the income threshold is designed to keep high-skilled workers from shifting to welfare. In the regulatory case, z is set so that it is just binding on recipients. So the z decreases as μ increases to reflect the decrease in the optimal market labor supply of a welfare recipient.

Proposition 4 reveals an important empirical implication of the model. Assume that the econometrician cannot observe the taste for paternalism. This unobserved factor induces a positive correlation between benefit levels and work requirements when the other variables of the model are held constant. Consequently, proposition 4 suggests a test for the importance of paternalism even if the concept were not well measured.

Figure 5 illustrates a numerical example of the effect of paternalism on tax rates. Here we vary μ for two different values of the policymaker's income $\widehat{\rho}$. The flat part of the tax rate curve corresponds to such low values of μ that $c^* = 0$ and the tax rates are those that emerge in the absence of paternalism. For higher values of $\widehat{\rho}$, the optimal tax rate in the benchmark is zero. Tax rates begin to rise in both cases when μ equals a critical value $\widetilde{\mu}_1^i$ for $\widehat{\rho} = .6$ and $\widetilde{\mu}_1^r$ for $\widehat{\rho} = .9$. Eventually, the tax rate converges to $t^* = \mu$ for both values of $\widehat{\rho}$. It is important to note that there are no discontinuities in tax rate associated with moving from the insurance to regulatory regimes in either case. Indeed, this is a general feature of the equilibrium.

Figure 6 shows the effect of paternalism on the work requirements for the same two examples. A couple of features are noteworthy. First, note that the policymaker with the higher income tends to impose stronger work requirements for a given level of paternalism. At first blush, this would seem to contradict the "local" comparative statics results. But recall that the pater-
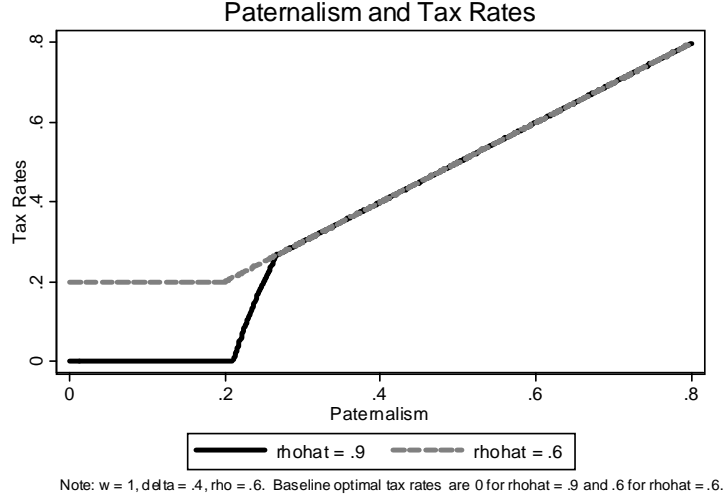
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Figure 5: Paternalism and Tax Rates

nalistic regime begins for lower values of μ when the policymaker represents a high income. So in the region $\mu \in [.1, .4]$, we are comparing one policymaker in the regulatory regime and another in the insurance regime. So local comparative statics results may be misleading. Also note that it is possible (but not necessary) for the work requirements to jump discontinuously as μ reaches the level of the regulatory regime as it does for $\widehat{\rho} = .6$. Comparison of the work requirements in Propositions 2 and 3 shows that the jump is $-\ln \delta$, and it is associated with switching from a binding ICH to a binding ICL. There is no jump for $\widehat{\rho} = .9$ because the "no paternalism" equilibrium prevails for all values of μ in the insurance regime.

Now we turn to the results for variation in economic and labor market factors. Consider average wages. Because δ is equal to the ratio of high and low wages regardless of w, and increase in w amounts to an increase in per-capita wages, holding wage inequality constant. The tax rate does not depend on w, but z and c must adjust with w to maintain proper incentives. In both regimes, z increase in w to accommodate the greater willingness low
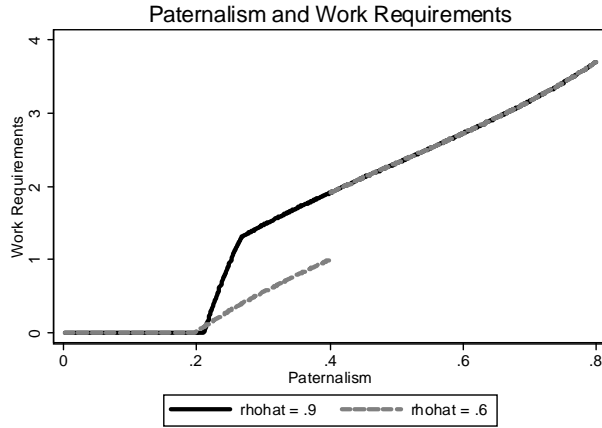
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Figure 6: Paternalism and Work Requirements

wage workers to supply market labor. But the magnitude of these effects is tempered by concerns about benefit uptake by high skilled types in the insurance regime.

One of the most important questions in the political economy of social policy is how levels of income and wage inequality affect policy choices. To assess this effect, we wish to adjust inequality while maintaining the same per-capita wage level. But because the average wage is $\overline{w} = \rho w + (1 - \rho)\delta w$, increasing δ simultaneously decreases wage inequality while raising per-capita wages. So to examine the effects of inequality holding average wages constant, we differentiate both with respect to w and δ in the direction along which $\overline{w}$ remains constant. The first result is that inequality increases tax and transfers in both regimes. As noted in the discussion of the observable case, this is a standard result for models of redistribution but differs from other models of social insurance. That it holds in the regulatory regime is somewhat more surprising. But the logic is straightforward. When inequality is high, the policymaker has more leverage to use transfers to induce low-wage workers into stiff regulatory requirements.

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The effects of inequality, on the other hand, are more ambiguous, with respect to work requirements and income thresholds.

7 Extensions

7.1 Altruism

Obviously, insurance and paternalism are not the only motivations that citizens and policymakers bring to the design of income support programs. Altruistic motivations towards the poor are also very important. Such motivations can be added to our model in a very straightforward way. Now assume that high-wage citizens not only care about their own utilities but also the utilities of the poor. So now we let the utility of a high-wage worker be

$$\widetilde{U}(w,t,z) = (1-\beta)U(w,t,z) + \beta(U(\delta w,t,z) - c)$$

where $0 < \beta < 1$ is the weight they place of the utility of the low-wage workers. Now the utility of the policymaker is

$$\hat{\rho}\widetilde{U}(w,t,z) + (1-\hat{\rho})\left[U(\delta w,t,z) - c\right] + \mu c$$
$$= \hat{\rho}(1-\beta)U(w,t,z) + (1-\hat{\rho}+\hat{\rho}\beta)\left[U(\delta w,t,z) - c\right] + \mu c$$

So now the policymaker behaves as if she represents a group with income $\hat{\rho}(1-\beta) < \hat{\rho}$. So in our model, the primary effect of this form of altruism is to increase tax and benefit rates in the insurance regime but has no effect on the regulatory regime (except that its boundary condition becomes $\mu > 1 - \hat{\rho} + \hat{\rho}\beta$.

Assume that μ is small so that the insurance regime prevails. Then extrapolating from Proposition 4, we predict that tax rates and work requirements are increasing in β while thresholds decrease.

7.2   Implementation

Mead (2004) argues that high levels of bureaucratic and state capacity are necessary to implement paternalistic policy regimes. After all, work requirements and the like must be enforced in thorough and impartial ways. To incorporate such considerations into our model, we assume that enforcement of work requirements is costly. We model enforcement as an auditing game where each welfare recipients chooses whether to comply with the work requirement, and in turn the policymaker may audit to determine whether or not recipient complied. If the recipient is caught in non-compliance, she is sanctioned with an additional (supervised) work requirement of χ units of utility[9]. We assume that this compliance auditing stage occurs after benefits have been distributed and consumed.

Let $\sigma(c, \chi)$ be the probability that a recipient complies with work requirement c given sanctions χ. Let $\psi(c, \chi)$ be the proportion of the caseload that the policymaker audits. Auditing costs k units of utility. Highly competent welfare bureaucracies have low values of k. In what follows we suppress the dependence of the auditing and compliance probabilities on c and χ.

The payoff to a low-wage welfare recipient is now

$$\left(\ln(z + t\gamma w) - \frac{z}{\delta w} \right) - (1 - \sigma)\,\psi\,(c + \chi) - \sigma c$$

So now the policymaker's' objective is

$$\begin{aligned}
\hat{\rho}\,[&\ln((1 - t)w) - 1] \\
&+ (1 - \hat{\rho})\left[\ln(z + t\gamma w) - \frac{z}{\delta w} - (1 - \sigma)\,\psi\,(c + \chi) - \sigma c \right] \\
&+ \mu\,(\sigma c + \psi\,(1 - \sigma)\,(c + \chi) - k\psi
\end{aligned}$$

---

[9] We take χ as fixed and exogenous. We could make χ equal to the benefit but that would complicate the choice of benefit.

We begin our analysis in the compliance auditing subgame. Because compliance is costly for the recipient, the only pure strategy equilibria in this subgame involve non-compliance and no auditing. Suppose this were not the case and the recipient chooses, $\sigma = 1$. Then the policymaker's best response is $\psi = 0$. Then the recipient has a clear incentive to defect to $\sigma = 0$. For $(\sigma, \psi) = (0, 0)$ to be a pure strategy equilibrium, the policymaker most have no incentive to audit even if the recipient is certain to be non compliant. This is true if and only if $k \geq \mu\chi$.

For the case where $k < \mu\chi$, the unique equilibrium is in mixed strategies. In the mixed strategy equilibrium, the recipient must be indifferent between complying with a c unit work requirement and defecting. Therefore, ψ must solve

$$-c = -\psi(c + \chi) + (1 - \psi)0$$

or

$$\psi(c, \chi) = \frac{c}{c + \chi}.$$

Similarly, the policymaker must be indifferent between auditing and not auditing. This requires

$$-k + \sigma 0 + (1 - \sigma)\mu\chi = 0$$

or

$$\sigma(c, \chi) = 1 - \frac{k}{\mu\chi}$$

Having solved for the equilibria of the compliance-auditing subgame, we can step back and analyze how the outcome affects the choice of taxes, benefits, and work requirements at the previous stage. In the case of $k \geq \mu\chi$, recipients never comply with work requirements. So in equilibrium $c = 0$. Consequently, the policymaker can only implement the baseline equilibrium regardless.

Now consider $k < \mu\chi$. We can plug equilibrium auditing and compliance

probabilities into the policymaker's objective. After some collection of terms, the objective becomes

$$\hat{\rho}\left[\ln\left((1-t)w\right)-1\right]+(1-\hat{\rho})\left[\ln\left(z+t\gamma w\right)-\frac{z}{\delta w}-c\right]+\left(\mu-\frac{k}{\chi}\right)c.$$

The form of this objective function is the same as the original with perfect compliance. But now the paternalism parameter is reduced by $\frac{k}{\chi}$. So high auditing costs or low sanctions low induces the policymaker to acts as less paternalistically.

8 Conclusion

Paternalism has undoubtedly played an important role in selling the idea of welfare reform to the American public. But there is still substantial debate both as to the normative desirability of paternalism and to whether paternalistic principals were actually implemented in the reforms undertaken in the American states. Although reasonably silent on the first question, this paper helps to resolve the second by deducing a set of logical implications of paternalistic welfare policy. In future work, we hope to test these propositions about paternalistic welfare policy on the patterns of policy adoption in the American states.

9 Appendix

Proof of Proposition 1: Let λ be the multiplier for ICH and φ and ζ be the multiplier for the non-negativity of c and z respectively. So after some rearranging, the Kuhn-Tucker conditions are:

$$t = 1 - \widehat{\rho} - \lambda - \frac{(\widehat{\rho} + \lambda)}{\gamma}\frac{z}{w}$$

$$\frac{z}{w} = \frac{1 - \widehat{\rho} - \lambda}{1 - \widehat{\rho} - \delta\lambda - \delta w\zeta}\delta - t\gamma$$

$$\lambda + \varphi = (1 - \widehat{\rho})$$

$$0 = \lambda\left[\ln\left((1 - t)w\right) - 1 - \ln\left(z + t\gamma w\right) + \frac{z}{w} + c\right]$$

Assume that the proposition is false so that $c^n > 0$. Therefore, $\varphi^n = 0$ and $\lambda^n = 1 - \widehat{\rho}$. This in turn implies that the first two conditions can be satisfied if and only if $t^n = 0$ and $z^n = 0$. But if $t^n = 0$ and $z^n = 0$, then there is slack in the ICH which violates condition 4 generating the desired contradiction. QED

Lemma 5 *The policymaker always chooses an income threshold z that is never larger than the optimal market income of a low-skilled welfare recipient.*

Proof of Lemma: As shown in the text, the utility of a welfare participant is $\ln((1-t)\omega(1-\frac{B}{\omega})+B) - 1 - \frac{B}{\omega} - c$ if z does not bind and $\ln((1-t)z+B) - 1 - \frac{B}{\omega} - c$ if it does. First, assume that the policymaker chooses z sufficiently high that it constrains neither type of citizen. If the ICH binds, reducing the income threshold to a level that would constrain high-skilled workers reduces their utility from welfare and creates slack that allows the policymaker to reduce c which increases the utility of low-skilled workers. This benefits the policy maker so long as $\mu < 1 - \widehat{\rho}$ (the condition for required for the ICH to bind). Such gains from reducing z continue until it reaches the optimal market income for low-skilled recipients. Therefore, $z^* \leq \omega(1 - \frac{B}{\omega})$.

Now suppose that the ICL binds and $z > \omega(1 - \frac{B}{\omega})$. The policymaker can reduce z to $\omega(1 - \frac{B}{\omega})$ without affecting her payoffs or the ICL. Thus, $z = \omega(1 - \frac{B}{\omega})$ weakly dominates $z > \omega(1 - \frac{B}{\omega})$. QED

Lemma 6 *For all $z > 0$ and $t \in [0, 1]$, the set of c that satisfy both ICH and ICL is non-empty.*

Proof of lemma: We must consider three cases depending on the magnitude of z.

Case 1: $z > w \left(1 - t \frac{\rho}{1-\rho} \right)$

In this case, the income threshold is not binding so both high- and low-skilled workers choose their optimal labor supply while on welfare. High-skilled working choose $l = 1 - t \frac{\rho}{1-\rho}$ and low-skilled workers choose $l = 1 - t \frac{\rho}{\delta(1-\rho)}$. Therefore, the IC constraints are

$$\ln \left(w(1-t)\gamma \right) + t\gamma w) - (1 - t\gamma) - \ln \left((1-t)w \right) + 1 \leq c$$

and

$$\ln \left(w\delta \left(1 - \frac{t\gamma}{\delta} \right) + t\gamma w \right) - \left(1 - \frac{t\gamma}{\delta} \right) - \ln \left((1-t)\delta w \right) + 1 \geq c$$

Consequently, for the set of feasible work requirements to be non-empty, we require

$$-(1 - t\gamma) \leq - \left(1 - t\frac{\gamma}{\delta} \right)$$

which holds for $\delta < 1$.

Case 2: $w \left(\delta - t\gamma \right) < z < w \left(1 - t\gamma \right)$

Now the income threshold binds for high-skilled workers but not low-skilled workers. The IC constraints become

$$\ln \left(z + t\gamma w \right) - \frac{z}{w} - \ln \left((1-t)w \right) + 1 \leq c$$

and

$$\ln \left(w\delta \left(1 - \frac{t\gamma}{\delta} \right) + t\gamma w \right) - \left(1 - \frac{t\gamma}{\delta} \right) - \ln \left((1-t)\delta w \right) + 1 \geq c$$

The feasible set of requirements is non-empty if and only if

$$\ln \left(w \right) - \left(1 - t\frac{\gamma}{\delta} \right) > \ln \left(z + t\gamma w \right) - \frac{z}{w}$$

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Because the high-skilled worker is constrained by the threshold, the left-hand side must be increasing in z. Therefore, we need only check the inequality at $z = w(1 - t\gamma)$. The inequality holds if

$$-(1 - t\gamma) \leq -\left(1 - t\frac{\gamma}{\delta}\right)$$

which holds for $\delta < 1$.

Case 3: $z < w(\delta - t\gamma)$

Now the IC constraints are

$$\ln(z + t\gamma w) - \frac{z}{w} - \ln((1 - t)w) + 1 \leq c$$

and

$$\ln(z + t\gamma w) - \frac{z}{\delta w} - \ln((1 - t)w) - \ln(\delta) + 1 \geq c$$

Algebraic manipulation shows that the constraints can both be satisfied if

$$-\frac{\delta \ln(\delta)}{1 - \delta} > \frac{z}{w}$$

Inserting the condition $z < w(\delta - t\gamma)$, we can rewrite the condition as

$$t\gamma > \delta + \frac{\delta \ln(\delta)}{1 - \delta}$$

This holds for any $t > 0$ because the left hand side is negative for any $\delta < 1$. *QED*

Proof of Proposition 2: (regulatory) Let λ be the multiplier for the ICL and φ and ζ be the multiplier for the non-negativity of c and z respectively. After some rearranging, the Kuhn-Tucker conditions are:

$$t = 1 - \widehat{\rho} + \lambda - \frac{(\widehat{\rho} - \lambda)}{\gamma} \frac{z}{w}$$

$$\frac{z}{w} = \frac{1 - \widehat{\rho} + \lambda}{1 - \widehat{\rho} + \lambda - \delta w \zeta} \delta - t\gamma$$

$$-\lambda + \varphi = 1 - \widehat{\rho} + \mu$$

$$0 = \lambda \left[\ln(z + t\gamma w) - \frac{z}{\delta w} - c - \ln((1-t)\delta w) + 1 \right]$$

and more rearranging

$$t = 1 - \frac{\delta}{\gamma} \left[\frac{(\widehat{\rho} - \lambda)}{1 - \widehat{\rho} + \lambda - \delta w \zeta} \right]$$

$$z = w \left[\frac{\delta}{1 - \widehat{\rho} + \lambda - \delta w \zeta} - \gamma \right]$$

$$c = 1 - \ln \left[\frac{\delta(\widehat{\rho} - \lambda)}{\gamma(1 - \widehat{\rho} + \lambda)} \right] - \frac{1}{1 - \widehat{\rho} + \lambda - \delta w \zeta} + \frac{\gamma}{\delta}$$

$$-\lambda + \varphi = 1 - \widehat{\rho} - \mu$$

First, we consider solutions such that $z > 0$ and $c > 0$. In such a solution $\varphi = \zeta = 0$ and $\lambda = \mu - 1 + \widehat{\rho}$. Therefore,

$$t^* = 1 - \delta \frac{(1 - \mu)}{\gamma \mu}$$

$$z^* = w \left[\frac{\delta}{\mu} - \gamma \right]$$

$$c^* = \ln \left[\frac{\gamma \mu}{\delta(1 - \mu)} \right] + 1 - \frac{1}{\mu} + \frac{\gamma}{\delta}$$

Note that c^* is monotonically increasing in μ and cannot be greater than 0 for small values of μ. So let $\widetilde{\mu}_1^r$ solve $c^* = 0$. For $\mu < \widetilde{\mu}_1$, the outcome is identical to the no paternalism case. Now consider the case where $z = 0$ binds. Because z^* is monotonically decreasing in μ, there may be a cutpoint

$\widetilde{\mu}_2^r = \frac{\delta}{\gamma}$ such that $z^* = 0$ for $\mu > \widetilde{\mu}_2^r$. If $z^* = 0$, the remaining Kuhn-Tucker conditions become

$$
\begin{aligned}
t &= 1 - \widehat{\rho} + \lambda \\
c &= \ln\left((1 - \widehat{\rho} + \lambda)\gamma\right) - \ln\left[\delta(\widehat{\rho} - \lambda)\right] + 1 \\
\lambda &= \mu - 1 + \widehat{\rho}
\end{aligned}
$$

Therefore, the solutions are $t^* = \mu$ and $c^* = \ln\left(\frac{\gamma\mu}{\delta(1-\mu)}\right) + 1$.

QED

Proof of Proposition 3: (insurance) Let λ be the multiplier for ICH and φ and ζ be the multiplier for the non-negativity of c and z respectively. So after some rearranging, the Kuhn-Tucker conditions are:

$$
\begin{aligned}
t &= 1 - \widehat{\rho} - \lambda - \frac{(\hat{\rho} + \lambda)}{\gamma}\frac{z}{w} \\
\frac{z}{w} &= \frac{1 - \hat{\rho} - \lambda}{1 - \hat{\rho} - \delta\lambda - \delta w\zeta}\delta - t\gamma \\
\lambda + \varphi &= 1 - \hat{\rho} + \mu \\
0 &= \lambda\left[\ln\left((1-t)w\right) - 1 - \ln\left(z + t\gamma w\right) + \frac{z}{w} + c\right]
\end{aligned}
$$

After rearranging some more, we get

$$
\begin{aligned}
t &= 1 - \frac{\delta}{\gamma}\left[\frac{\hat{\rho} + \lambda}{1 - \hat{\rho} - \delta\lambda - \delta w\zeta}\right] \\
z &= w\left[\frac{\delta}{1 - \hat{\rho} - \delta\lambda - \delta w\zeta} - \gamma\right] \\
c &= 1 - \ln\left[\frac{\hat{\rho} + \lambda}{\gamma(1 - \hat{\rho} - \lambda)}\right] - \frac{\delta}{1 - \hat{\rho} - \delta\lambda - \delta w\zeta} + \gamma \\
\lambda + \varphi &= 1 - \hat{\rho} - \mu
\end{aligned}
$$

First, we solve for solutions where $z > 0$ and $c > 0$. This implies that

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$\zeta = \varphi = 0$ and $\lambda = 1 - \hat{\rho} - \mu$. Substituting , we find

$$
\begin{aligned}
t^* &= 1 - \frac{1-\mu}{\gamma} \frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})} \\
z^* &= w\left[\frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})} - \gamma\right] \\
c^* &= \ln\left(\frac{\mu\gamma}{1-\mu}\right) + 1 + \gamma - \frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})}
\end{aligned}
$$

Note that c^* is monotonically increasing in μ. So let $\widetilde{\mu}_1^i$ solve $c^* = 0$. For $\mu < \widetilde{\mu}_1^i$, the outcome is identical to the no paternalism case.

Now we can solve for the case where $z = 0$ binds. Since z is monotonically decreasing in μ, this occurs for $\mu > \frac{\delta - \gamma(1-\delta)(1-\hat{\rho})}{\gamma\delta} = \widetilde{\mu}_2^i$. Since $c > 0$, the remaining conditions are

$$
\begin{aligned}
t &= 1 - \widehat{\rho} - \lambda \\
\lambda &= 1 - \hat{\rho} + \mu
\end{aligned}
$$

which implies that $t^* = \mu$ and $c^* = \ln\left(\frac{\mu\gamma}{1-\mu}\right) + 1$.

QED

Proof of Proposition 4: Except where noted, all results are partial differentiation of the results in Propositions 2 and 3.

Policymaker's Income

Regulatory Regime: Policy does not depend on $\widehat{\rho}$.

Insurance Regime: If $\widetilde{\mu}_1^i < \mu \leq \widetilde{\mu}_2^i$, the partial effects of changes in $\hat{\rho}$ are

$$\frac{\partial t}{\partial \hat{\rho}} = \frac{-\delta(1-\delta)\left(1-\mu\right)}{\gamma\left(\delta\mu+(1-\delta)(1-\hat{\rho})\right)} < 0$$

$$\frac{\partial z}{\partial \hat{\rho}} = \frac{w\delta(1-\delta)}{[\delta\mu+(1-\delta)(1-\hat{\rho})]^2} > 0$$

$$\frac{\partial c}{\partial \hat{\rho}} = -\frac{1-\delta}{\delta\mu+(1-\delta)(1-\hat{\rho})} < 0.$$

All of these derivatives are 0 if $\widetilde{\mu}_2^i < \mu$.

Paternalistic preferences

Regulatory regime: If $\widetilde{\mu}_1^r < \mu \leq \widetilde{\mu}_2^r$,

$$\frac{\partial t}{\partial \mu} = \frac{\delta}{\gamma\mu^2} > 0$$

$$\frac{\partial z}{\partial \mu} = -\frac{w\delta}{\mu^2} < 0$$

$$\frac{\partial c}{\partial \mu} = \frac{1}{\mu} + \frac{1}{1-\mu} + \frac{1}{\mu^2} > 0$$

If $\mu > \widetilde{\mu}_2^r$,

$$\frac{\partial t}{\partial \mu} = 1$$

$$\frac{\partial z}{\partial \mu} = 0$$

$$\frac{\partial c}{\partial \mu} = \frac{1}{\mu} + \frac{1}{1-\mu} > 0.$$

Insurance regime:

If $\widetilde{\mu}_1^i < \mu \leq \widetilde{\mu}_2^i$,

$$\frac{\partial t}{\partial \mu} = \frac{\delta}{\gamma} \frac{(1-\delta)(1-\hat{\rho}) + \delta}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} > 0$$

$$\frac{\partial z}{\partial \mu} = -\frac{w\delta^2}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} < 0$$

$$\frac{\partial c}{\partial \mu} = \frac{1}{\mu} + \frac{1}{1-\mu} + \frac{\delta^2}{(\delta\mu + (1-\delta)(1-\hat{\rho}))^2} > 0$$

If $\mu > \widetilde{\mu}_2^i$,

$$\frac{\partial t}{\partial \mu} = 1$$

$$\frac{\partial z}{\partial \mu} = 0$$

$$\frac{\partial c}{\partial \mu} = \frac{1}{\mu} + \frac{1}{1-\mu} > 0$$

Average Wages

Tax rates and work requirements do not depend on w or $\overline{w} = \rho w + (1 - \rho)\delta w$.

Regulatory Regime: If $\widetilde{\mu}_1^r < \mu \leq \widetilde{\mu}_2^r$,

$$\frac{\partial z}{\partial \overline{w}} = \left(\frac{\gamma + \delta}{1 + \gamma}\right)\left[\frac{\delta}{\mu} - \gamma\right] > 0$$

and $\frac{\partial z}{\partial \overline{w}} = 0$ if $\mu > \widetilde{\mu}_2^r$.

Insurance Regime: If $\widetilde{\mu}_1^i < \mu \leq \widetilde{\mu}_2^i$,

$$\frac{\partial z}{\partial \overline{w}} = \left(\frac{\gamma + \delta}{1 + \gamma}\right)\left[\frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})} - \gamma\right] > 0$$

and $\frac{\partial z}{\partial \overline{w}} = 0$ if $\mu > \widetilde{\mu}_2^i$.

Wage Equality

But because the average wage is $\overline{w} = \rho w + (1 - \rho)\delta w$, increasing δ simultaneously decreases wage inequality while raising average wages. So to examine the effects of inequality holding average wages constant, we differentiate both with respect to w and δ in the direction along which $\overline{w}$ remains constant. This direction is

$$\left(1, -\frac{\frac{\partial \overline{w}}{\partial \delta}}{\frac{\partial \overline{w}}{\partial w}}\right) = \left(1, -\frac{w}{\gamma + \delta}\right)$$

where the first component is the gradient along the δ axis. Therefore, we can write the partial of any endogenous variable y with respect to δ holding $\overline{w}$ as

$$\frac{\partial y}{\partial \delta | \overline{w}} = \frac{\partial y}{\partial \delta} - \frac{w}{\gamma + \delta} \frac{\partial y}{\partial w}.$$

Because only z depends on w, $\frac{\partial t}{\partial \delta | \overline{w}} = \frac{\partial t}{\partial \delta}$ and $\frac{\partial c}{\partial \delta | \overline{w}} = \frac{\partial c}{\partial \delta}$ in all cases.
Regulatory regime: If $\widetilde{\mu}_1^r < \mu \leq \widetilde{\mu}_2^r$,

$$\begin{aligned}
\frac{\partial t}{\partial \delta} &= -\frac{1 - \mu}{\mu \gamma} < 0 \\
\frac{\partial z}{\partial \delta} &= \frac{w}{\mu} > 0 \\
\frac{\partial c}{\partial \delta} &= \gamma - \frac{1}{\delta}.
\end{aligned}$$

$$\frac{\partial z}{\partial \delta | \overline{w}} = \frac{1}{\mu}\left[\frac{w}{\gamma + \delta}\right] + \frac{w}{\gamma + \delta} > 0.$$

These derivatives are 0 otherwise.

Insurance Regime: If $\widetilde{\mu}_1^i < \mu \leq \widetilde{\mu}_2^i$,

$$\frac{\partial t}{\partial \delta} = -\frac{1-\mu}{\mu\gamma}\frac{(1-\hat{\rho})}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} < 0$$

$$\frac{\partial z}{\partial \delta} = \frac{w(1-\hat{\rho})}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} > 0$$

$$\frac{\partial c}{\partial \delta} = \frac{-(1-\hat{\rho})}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} < 0.$$

$$\frac{\partial z}{\partial \delta|\overline{w}} = \frac{w(1-\hat{\rho})}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} - \left[\frac{\delta}{\delta\mu + (1-\delta)(1-\hat{\rho})} - \gamma\right]\frac{w}{\gamma + \delta}.$$

At $\mu = 1 - \widehat{p}$,

$$\frac{\partial z}{\partial \delta|\overline{w}} = \frac{1}{\mu}\left[\frac{w\rho}{\rho + (1-\rho)\delta}\right] + \frac{\rho w}{\rho + (1-\rho)\delta} > 0.$$

So it must be positive for some parameter values.   But the sign of

$$\frac{\partial z}{\partial(\delta|\overline{w})\partial\mu} = -\frac{\delta 2 w(1-\hat{\rho})\delta\mu}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2} + \frac{\delta^2}{[\delta\mu + (1-\delta)(1-\hat{\rho})]^2}\frac{w}{\gamma + \delta}$$

is ambiguous, so we can not rule out a negative effect of inequality on the income threshold.

The effects of inequality are 0 if $\mu > \widetilde{\mu}_2^i$.   *QED*

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