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Fractionalization and the size of government*

Jo Thori Lind†

August 12, 2003

Abstract

I study the effect of voters with a group-based social conscience. Voters then care more about the well-being of those belonging to their own group than the rest of the population. Within a model of political tax determination, both fractionalization and group antagonism reduce the support for redistribution. Whereas within group inequality increases support for redistribution, inequality between groups has the opposite effect. All these results hold even if a poor group is in majority. Using a panel data set for the US constructed from micro data, I find support for the hypothesis that within race inequality increases and between race inequality decreases redistribution.

Keywords: Fractionalization, political economy, inequality, redistribution, race

JEL classification: D31, D72, E62, H20

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First, the American public thinks that most people who receive welfare are black, and second, the public thinks that blacks are less committed to the work ethic than other Americans. There exists now a widespread perception that welfare has become a "code word" for race (Gilens 1999: 3).

1 Introduction

The above quote from Martin Gilens's (1999) book *Why Americans Hate Welfare* is representative for a widespread view: It's impossible to understand the American welfare state without considering race, and if not racism, at least racial stereotypes. In this paper I will explore how this may enhance economists' understanding of the relationship between inequality, fractionalization, and redistribution. This is important not only to understand the American welfare state, but also to understand politics in other heavily fractionalized societies, such as most African countries.

The conventional political economy approach to analysing preferences for redistribution is through the median voter model. The main result is more redistribution in societies with high inequality than in societies with less, as the median voter's preferences for redistribution are inversely related to the difference between her income and the average income (Romer 1975, Roberts 1977, Meltzer and Richard 1981). The empirical support for the hypothesis is mixed. Bénabou (1996) survey a number of older studies that mostly reject it. Milanovic (2000) claims this is mainly due to data problems. Using an improved data set, he finds support for the theory. The most striking argument against the theory is probably the difference between most European countries and the US, and to an even larger extent most Latin American countries.[1]

A separate literature has recently emerged studying the effects of fractionalization

[1]Recent research has attempted to explain this puzzle. Bénabou's (2000) model is probably the best known. He presents a model where redistribution both has beneficial effects due to credit market imperfections and distorts the labour supply decision. Under reasonable assumptions, there may be political support for two "social contracts", one with an even distribution of income and support for redistribution to reduce the effects of missing credit markets, and one with high inequality and little support for redistribution. Competing explanations have been proposed by e.g. Saint-Paul (2001), Roemer (1998, 1999), Moene and Wallerstein (2001), Bjorvatn and Cappelen (2002), and Alesina, Glaeser, and Sacerdote (2001).

along ethnic, linguistic, religious, and other lines on public policy and economic performance. There is now a substantial theoretical literature explaining why particularly public good provision is lower in fractionalized communities,[2] and the empirical support for the detrimental effects of fractionalization on public policy is quite strong.[3] However, this literature generally studies agents that are equal except for their group belonging, so we can't study the relationship between income distribution and public policy in fractionalized societies.

The main novelty of my approach is the joint modelling of group and income heterogeneity. I can then study how each of these influence support for redistribution as well as how the joint impact is. It turns out that inequality may have very different effects on support for redistribution in fractionalized and non-fractionalized societies.

I present a model in the tradition of Romer-Roberts-Meltzer-Richard where a tax used for redistributive transfers is determined by popular vote. Unlike the traditional model, I allow voters to have a social conscience in that they care about social welfare in addition to their private well-being. In itself, this extension does not change the main conclusions of the model. But in fractionalized societies, it is natural to assume that agents care mostly about the welfare of those belonging to their own group, that is, agents have a group or race bias in their social conscience. I label this group antagonism. Then two persons with the same endowment, but one belonging to a rich and one to a poor group, have different preferences for taxation. The poorer the group one belongs to, the higher is the preferred tax rate. This means that voters with the median preferred tax rate will

[2]Based on such factors as differentiated tastes (Alesina, Baqir, and Easterly 1999), antagonism to mixing with members of other groups (Alesina and La Ferrara 2000), and the fact that social sanctions are more efficient within groups than between groups (Miguel and Gugerty 2003). There is also some earlier theoretical contributions mainly based on social conflict and lack of social capital (*inter alia* Benhabib and Rusticini 1996, Knack and Keefer 1997, Keefer and Knack 2002, Rodrik 1999), but they are less relevant for this paper.

[3]Alesina and his co-workers have documented that fractionalization tends to reduce the supply of public goods, redistribution, and participation in US communities (Alesina, Baqir, and Easterly 1999, Alesina, Glaeser, and Sacerdote 2001, Alesina and La Ferrara 2001). This is corroborated by similar findings in Pakistan (Khwaja 2002) and Kenya (Miguel and Gugerty 2003). Furthermore, comparing Kenya, where ethic conflicts are important, to Tanzania, where there is less ethnic conflict, Miguel (2003) finds that ethnic fractionalization is important in Kenya but insignificant in Tanzania.

have different endowments depending on which group they belong to. Consequently, we can no longer talk about the median voter as a single agent. Instead, there is a set of median voters, one from each group.

The model gives two key insights. First, both fractionalization and group antagonism reduces the support for redistribution, even if the poor group is in majority. This is because higher group antagonism, in the sense that people care more about their own group and less about the others, tends to reduce the preferred tax rate for voters who belong to a rich group. An increase in the degree of fractionalization therefore leads to a new set of median voters. Median voters who belong to a rich group now prefer lower tax rates and are replaced by poorer agents. Median voters who belong to a poor group are replaced by richer agents. Under general conditions, the result of this process is a political economic equilibrium where the chosen tax rate is lower. This is because the initial median voter from the poor group was in a higher income fractile within her group than the voter from the rich group. When the income distribution for each group is skewed to the right, this implies that the increase in the income of the median voters from the poor groups is larger than the decline in the income of the voters from the rich groups. Thus the tax rate preferred by the new set of median voters must be lower. When fractionalization is high, this effect is stronger.

Second, the model also predicts that increased inequality between groups will reduce the support for redistribution. The reasoning is quite similar to the one above; when the rich group becomes richer, their preferences for redistribution decline. Hence the new median voter from the rich group is poorer and vice versa for the poor group. Again, the decline in the income of the median voter from the rich group is smaller than the rise in the income of the median voter from the poor group. Then the new political equilibrium is a lower tax rate and less redistribution. This result is also independent of which group is in majority.

To test the validity of the key insights of the model, I use a panel of US states observed in six years between 1969 and 2000. As data on inequality by race are not available in preexisting sources, I constructed these data using micro data from the Luxembourg Income Study. Unlike most earlier studies, this permits focusing on pre-tax income which should be the relevant variable for determining tax preferences. The empirical support for the model is good: Fractionalization and between group inequality tends to reduce redistribution whereas with group inequality increases it. Although the effect of between group inequality is usually not significantly smaller than zero, it is significantly smaller than the effect of within group inequality. These conclusions are also robust to the inclusion of state fixed effects and robust regression techniques.

A related work is Austen-Smith and Wallerstein (2003), who present a model of joint determination of redistribution and scope of affirmative action. They show that in divided societies, support for welfare spending is lower than in non-divided societies. Vigdor (2001) alludes to a theory where people are altruistic to members of their own group and discusses the effect of this on provision of public goods. Collier (2000, 2001) discusses similar questions, but his analysis of democratic regimes is somewhat brief. I will also show that his conclusions do not necessarily hold in a more general framework. Luttmer (2001) studies the relationship between group membership and preferences for redistribution. He finds a preference structure that is similar to the one I use. However, he does not study the political-economic implication of these preferences. Persson and Tabellini (1994) also use a model with similarities to my model to study the effects of centralization, but their focus is also different. Finally there's a large literature in sociology and political science studying the impact of racial divide on policy making and political behaviour. The most comprehensive is probably Kinder and Sanders' (1996) study of a number of possible explanations of differing opinions between blacks and whites. Gilens (1999) study how racial stereotypes, mainly formed by the media, influence people's support for redistribution, while Wilson in a number of works (e.g. Wilson 1978, 1999) has discussed class based versus racially based political segmentation and advocated a multiracial coalition of the lower- and middle-class to combat poverty. Although the topic is similar, the theoretical approaches in these works are different from mine.

2 The model

2.1 The baseline case

I consider an economy with a continuum of heterogeneous agents with mass normalized to one. Each agent has an income or endowment of a taxable good whose distribution in the economy may be described by a cumulative density function F with support $\Omega \subseteq \mathbb{R}_{+}$. Denote by $\bar{x}$ and x^{m} the mean and median endowment. Utility derived from consumption of the good is given by the function u which is assumed to be increasing and concave. The model is static, so there are no credit markets. In the absence of transfers, an agent with endowment x reaches utility level $u(x)$, and under the assumption of a utilitarian social welfare function, social welfare equals $\int_{\Omega} u(x)\, dF(x)$.

There is a government that redistributes resources before production takes place. Every agent faces a linear tax rate t and receives a transfer $T(t)\bar{x}$ where T is a function that represents the outcome of taxation. The function takes account of a possible deadweight loss. We could of course model this explicitly as for instance a choice of labour supply, but this would add little to the model and make it more cumbersome. It is natural to assume that the deadweight loss is absent at $t = 0$ and increases as t increases. Hence I assume that T satisfies $T(0) = 0$, $T'(0) = 1$, $T'(t) \leq 1$, and $T''(t) < 0$, that is, a concave Laffer curve. For simplicity, I will also assume that $T'(1) < 0$ so T is maximized for a tax rate strictly below unity. The tax rate t is determined as the outcome of a political process where the chosen tax rate corresponds to the one preferred by the median voter.

All agents care about their own utility. However, they also have social conscience which implies that they care about the social welfare level. For a given mean income (tax base) $\bar{x}$, social welfare is given by

$$S(t, F) = \int_{\Omega} u\left[(1-t)x + T(t)\bar{x}\right] dF(x). \tag{1}$$

The last argument of S is an element from the space of income distributions, i.e. social welfare depends on the tax rate t and the society's income distribution F. Hence for a given tax rate, social welfare will change if we change the income distribution. Notice that S is linear in the income distribution in the sense that for two functions F_1 and F_2 and two constants a_1 and a_2, $S(t, a_1F_1 + a_2F_2) = a_1S(t, F_1) + a_2S(t, F_2)$.

Agents weight their private utility by $1 - \alpha$ and social welfare by α. Then an agent with initial endowment x maximizes

$$U(x, t) = (1-\alpha)\, u\left[(1-t)x + T(t)\bar{x}\right] + \alpha S(t, F) \tag{2}$$

where α is a coefficient of social conscience. Throughout the paper, I assume $\alpha \in [0, 1]$.[4] The assumption of social conscience may seem ad hoc. However, the decision to vote at

[4]We could also have $\alpha < 0$, which implies that the agent derives utility from consumption and

all is hard to justify by a purely selfish oriented argument. For instance Knack (1992) and Mueller (1987) argue that voting may be the outcome of "social behaviour". If the decision to vote is based on non-egoistic reasoning, it seems rather implausible that the political preferences should be purely egoistic. There is also overwhelming experimental evidence to support of "social preferences" (Charness and Rabin 2002), which corresponds closely to a utility function of the form (2). Hence I believe that the assumption of social conscience is plausible.

To simplify expression (2), consider the class of step functions

$$D_x(y) = \begin{cases} 0 & \text{if } y < x \\ 1 & \text{if } y \geq x, \end{cases} \tag{3}$$

that is, the distribution of a degenerate random variable that equals x with probability one. Now, it is seen that U may be rewritten

$$U(x,t) = (1-\alpha) S(t, D_x) + \alpha S(t, F) = S(t, (1-\alpha) D_x + \alpha F), \tag{4}$$

where the last equality follows from the linearity of S. The second term in the S-function, $(1-\alpha) D_x + \alpha F$, is the subjective weighting function for the individual, i.e. the weight the agent puts on persons from different income groups. If $\alpha = 0$, she only cares about agents with her income; if $\alpha = 1$ she uses the true distribution in society. For any such weighting function, the agent's preferred tax rate is found my maximizing S with regard to t. Since S is globally concave in t for any weighting function, the maximum is given by the first order condition[5]. It follows that preferences are single-peaked, so the median voter theorem applies. Furthermore, for $\alpha < 1$, the optimal t is decreasing in x. Denote by τ the function that to any given income distribution assigns the optimal tax rat, i.e.

$$\tau(G) = \arg\max_t S(t, G).$$

Since S is globally concave this is a single-valued function. Now the socially optimal tax rate is $\tau(F)$ whereas the tax rate preferred by an agent with endowment x is $\tau((1-\alpha) D_x + \alpha F)$.

superiority to the average of the economy, and also $\alpha > 1$ where the agent willingly accepts martyrdom. However, these cases are probably rather unrealistic.

[5]Given the characteristics of T, S is always maximized for a $t < 1$. If we require $t \geq 0$, there may be corner solutions for some agents. Although negative redistribution is unrealistic I will not exclude it to maintain analytic simplicity.

With few exceptions, I assume that income distributions are continuous, i.e. contains no mass points, so that fractiles are well-defined in all cases. The case of discontinuous distribution functions is used in some examples and is briefly discussed in a more general way in Appendix A. In the continuous case, the tax rate chosen by the median voter satisfies the system

$$\begin{cases} S_t\left(t,(1-\alpha)\, D_{x^m}+\alpha F\right)=0 \\ F\left(x^m\right)=\frac{1}{2} \end{cases} . \tag{5}$$

where S_t is the derivative of utility S with regard to the tax rate t.

2.2 Fractionalized societies

Assume now that the society is divided into a number of mutually exclusive groups where an agent belonging to one group cares more about the welfare of her group than that of other groups. For simplicity, assume that there are only two groups, A and B. The main results hold for multiple groups and overlapping group dimensions, but the model gets more cumbersome. A proportion q of the population belongs to group A and the remaining $(1-q)$ to group B. The income distribution[6] within the groups are described by F_A and F_B which are both assumed to have support Ω. Hence $F=qF_A+(1-q)\,F_B$. I will say that one group is richer than the other if the two groups' income distributions may be ranked by first order stochastic dominance. Throughout the paper, group A is the rich group and B the poor.

The case with *full group antagonism* is when agents completely ignore the welfare of other groups. Then the utility of a member of group $i\in\{A,B\}$ with endowment x is given by

$$U_i\left(x,t\right)=S\left(t,(1-\alpha)\,D_x+\alpha F_i\right). \tag{6}$$

As shown above, preferences are single-peaked and within one group, the desired tax rate is decreasing in x. However, two persons with identical endowments, but belonging to

[6] We may also allow agents to put different weights on agents with different endowments in their welfare calculi. The analysis so far has assumed that F_A and F_B correspond to actual income distributions but this is not necessary. If we keep $\bar{x}$ fixed, these cumulative income distributions may also include a subjective weighting of the different income groups.

different groups, have in general different preferred tax rates.[7] Hence it is insufficient to look at the initial endowments to find the median voter. In fact, we will have two median voters, one from each group. They have a common preferred tax rate, but in general their endowments differ. Call the endowment of the A median voter x_A^m and that of the B median voter x_B^m. Then the tax rate t chosen by the median voters satisfies the system

$$\begin{cases} S_t\left(t,(1-\alpha)D_{x_A^m}+\alpha F_A\right)=0 \\ S_t\left(t,(1-\alpha)D_{x_B^m}+\alpha F_B\right)=0 \\ qF_A\left(x_A^m\right)+(1-q)F_B\left(x_B^m\right)=\frac{1}{2} \end{cases}. \tag{7}$$

In general, we have $F_A(\cdot)\neq F_B(\cdot)$. Then normally the group-wise socially optimal tax rates $\tau(F_A)$ and $\tau(F_B)$ differs, so two agents from different groups with the same income x will have different preferred tax rates for any x. When there is some degree of group antagonism, the person belonging to the richest group prefers a lower tax rate than the one belonging to the poorest group. Then it follows that in the system (7), $x_A^m\neq x_B^m$, and the endowment is lowest for the one belonging to the richest group. Notice also that x_A^m and x_B^m does usually not correspond to the median endowment of the respective group, but is determined by the system (7) and corresponds to the incomes of the agents with median tax preference.

A less extreme and analytically more tractable case is where agents put some weight on their group and some on the society as a whole. I will label this *partial group antagonism*. Here, agents from group i with endowment x have preferences

$$U_i(x,t)=S\left(t,(1-\alpha)D_x+\beta\alpha F_i+(1-\beta)\alpha F\right). \tag{8}$$

I will restrict attention to $\beta\in[0,1]$. When $\beta=1$, we have the full antagonism case whereas the case without group antagonism corresponds to $\beta=0$.[8] The politically chosen tax rate t satisfies

$$\begin{cases} S_t\left(t,(1-\alpha)D_{x_A^m}+\beta\alpha F_A+(1-\beta)\alpha F\right)=0 \\ S_t\left(t,(1-\alpha)D_{x_B^m}+\beta\alpha F_B+(1-\beta)\alpha F\right)=0 \\ qF_A\left(x_A^m\right)+(1-q)F_B\left(x_B^m\right)=\frac{1}{2} \end{cases}. \tag{9}$$

[7] This is a quite general result in models where agents differ by income and other characteristics, such as overlapping generations-models (Persson and Tabellini 2000: Section 6.2.2).

[8] We could also have $\beta>1$, which is the racist agent who wants to hurt the other group, and $\beta<0$, which could be a "militant anti-racist" who wants to punish her own group. Both cases are rather extreme.

This is a system of three equations that determine the tax rate t and the income of the two pivotal voters x_A^m and x_B^m. I will label the parameter β the degree of group antagonism. An increase in β implies that agents put more emphasis on their own group and less on society as a whole. It is important to distinguish this parameter from the Herfindahl index of fractionalization often used in empirical analyses.

How should we understand this group-restricted social conscience? It may arise if we view social conscience as a result of reciprocity (Bowles, Fong, and Gintis 2001; Bowles and Gintis 2000; Charness and Rabin 2002). One person's caring for others is conditional on the other caring for the first as well. An equilibrium and focal point in this situation is that persons belonging to one group care about all the others in that group and no others. Secondly, a highly group-based social conscience corresponds closely to the sociological concept of *group self-interest* which finds strong empirical support in studies of support for welfare spending (Bobo and Kluegel 1993). For instance Kinder and Sanders (1996) find virtually no support for self-interest affecting political opinions, but conclude that group self-interest plays an important role. In the model set out above, this would mean both a high degree of social conscience α and a high degree of group antagonism β. Group antagonism may also be interpreted as a belief that people from one's own group are more deserving of public transfers than others, as found by e.g. Gilens (1999). Furthermore, the social conscience introduced above may be seen as agents considering welfare as a local public good where β is a measure of the localness of the good. However, unless groups are perfectly segregated geographically, "local" must be interpreted at a more abstract level than usual. Finally, this restricted social conscience may also be seen as an extension of Barro's (1974) dynastic utility function where the family now also includes the group, although possibly with a smaller weigh.

In the current model, the only objective of the government is to transfer income between individuals. However, in a dynamic setting, there could also be demand for a social insurance scheme. It is possible to interpret the model in this way: Assume for simplicity that voting takes place at some time, and society keeps that decision for ever. Agents are subject to income shocks arriving by some Poisson process, and if they are hit by a shock their income is redrawn from their group's income distribution. With an appropriate discount rate below unity, this will give a utility function of the form (8).

Notice that even if agents have the same degree of social conscience for both their own group and other groups, a segmented labour market, in the sense that new incomes are drawn from different distributions for different groups, is sufficient to make it appear as if the agent had a group biased social conscience. Hence we could reinterpret the whole model as an analysis of the consequences of a segregated labour market.

3 The size of government

3.1 Discrete income distributions

I will start the discussion of the impact of group antagonism on the size of government by looking at a simplified version of the model where there are only two levels of initial incomes, high income x^h and low income $x^l < x^h$. This means that the income distributions are step functions. The groupwise income distributions differ in the proportion of rich to poor agents. Hence except peculiar cases, the median voter will belong to a single group. Offhandedly, we might believe that an agent from a poor group always prefers a higher tax rate than one from a rich group. This will be the case if agents have a low degree of social conscience and group antagonism is low. I refer to this case as a class society as political preferences are determined mainly by income. In contrast, there are cases where the group biased social conscience is so strong that the poor agents from the rich group vote for a lower tax rate than the rich agents from the poor group. We may say that their altruism for the rich of their own group overrides their poverty on election day. I will label this a group society.

To simplify notation, I write $v^j(t) = u\left[(1-t)\,x^j + T(t)\,\bar{x}\right]$ for $j \in \{l, h\}$. Let q_i^j be the fraction of the population belonging to group i and having income j, as summarized in the following table:

	Poor	Rich	
As	q_A^l	q_A^h	q_A
Bs	q_B^l	q_B^h	q_B
	q^l	q^h	1

In what follows, I assume that there are a larger proportion of rich among the As than among the Bs, that is $q_A^h/q_A > q_B^h/q_B$. We consider the case with partial group antagonism. The four groups have preferences over the tax rate given by (8). We may rewrite each voters's maximand as $\psi v^l(t) + v^h(t)$ where the value of ψ is

$$\begin{array}{l} \psi_i^l = \frac{(1-\alpha)q_i+\alpha\beta q_i^l+\alpha(1-\beta)q^l q_i}{\alpha\beta q_i^h+\alpha(1-\beta)q^h q_i} \\ \psi_i^h = \frac{\alpha\beta q_i^l+\alpha(1-\beta)q^l q_i}{(1-\alpha)q_i+\alpha\beta q_i^h+\alpha(1-\beta)q^h q_i} \end{array}, \; i \in \{A, B\}.$$

As the As on average are richer than the Bs, the As put less weight on $v^l(t)$ than the Bs among both the rich and the poor. Furthermore, the poor As put more weight on this term than the rich Bs if

$$\frac{(1-\alpha)\, q_A + \alpha\beta q_A^l + \alpha(1-\beta)\, q^l q_A}{\alpha\beta q_A^h + \alpha(1-\beta)\, q^h q_A} > \frac{\alpha\beta q_B^l + \alpha(1-\beta)\, q^l q_B}{(1-\alpha)\, q_B + \alpha\beta q_B^h + \alpha(1-\beta)\, q^h q_B},$$

which holds if

$$(1-\alpha) - \alpha\beta\left(\frac{q_B^l}{q_B} - \frac{q_A^l}{q_A}\right) > 0. \tag{10}$$

This is the case if agents have a low degree of social conscience, a weak group-commitment, and the As are not much richer than the Bs. If (10) holds, we have what I labelled a class society above. If (10) does not hold, we have what I referred to as a group society since voting behaviour is determined by group membership.

A rise in β makes the As prefer a lower tax rate and the Bs a higher one as ψ_A^j is decreasing and ψ_B^j increasing in β for $j \in \{h, l\}$. Hence if the decisive voter belongs to group A, increased group antagonism will imply lower tax rates whereas a decisive voter from group B will give increased taxes. When $q_A^h > 1/2$ or $q_B^l > 1/2$ the high-income As or the low income Bs have the pivotal voter in all cases. This situation is relatively uninteresting, so I will disregard it. At $\beta = 0$, the two groups have identical tax preferences within each income group and (10) holds. A marginal rise in β makes the As prefer a lower rate than the Bs; in this case the poor As are the pivotal agents if $q^l > 1/2$, the rich Bs otherwise. The result is a reduced tax rate if the As are pivotal and an increase if the Bs are. However, at some stage, we may reach the level where (10) no longer holds. Then the pivotal agent changes to the other group. Notice though that there are cases where a single group remains pivotal for all values of β.

Consider now a slightly more complicated income distribution where there are N income levels in increasing order. Let q_i^j denote the fraction of society belonging to group $i \in \{A, B\}$ and having income level $j \in \{1, \ldots, N\}$. The fraction of As is $q_A = \sum_{j=1}^N q_A^j$

and $q_B = 1 - q_A$. The As are richer than the Bs in the sense that

$$\frac{1}{q_A}\sum_{j=1}^{n} q_A^j < \frac{1}{q_B}\sum_{j=1}^{n} q_B^j$$

for all $n < N$ (the distribution for the As first order stochastically dominates that for the Bs). When $\beta = 0$, there are two median voters with identical (median) income level J^m determined by[9]

$$\sum_{j=1}^{J^m} q_A^j + q_B^j > 1/2 \text{ and } \sum_{j=1}^{J^m-1} q_A^j + q_B^j < 1/2.$$

When β rises, the A-agent wants a lower tax rate and the B-agent a higher. If $q_B^{J^m} + \sum_{j=1}^{J^m-1}\left(q_A^j + q_B^j\right) < 1/2$, the A-agent is decisive for small β. Then the tax rate declines if β increases. Assume this is the case. For each income group sufficiently small, we reach a level of β where the A-median voter, whose income level is J^m, reaches the tax preference of the B-agent in income level J^{m+1}, the income level just above the A-agent. A continued rise in β will lead this B-agent to become decisive for some time. Then she is caught up by the A-agent with income level $J^m - 1$ and so on.

To study how tax preferences change when β rises, notice that the weighting function for an agent with income x belonging to group i may be written

$$\begin{aligned} & (1-\alpha) D_x + \alpha\beta F_i + \alpha(1-\beta) F \\ = \; & (1-\alpha) D_x + \alpha(\beta + (1-\beta) q_i) F_i + \alpha(1-\beta) q_{-i} F_{-i} \end{aligned} \tag{11}$$

where F_{-i} and q_{-i} is the distribution function and size of the other group. Here it is seen that the effect of a change in β on the weighting function is greater the smaller q_i is. If q_i is close to unity, then F already give group i a large weight, and a change in β has less effect than if group i has a smaller weight in F. Hence the smaller a group is, the larger are the changes in tax preferences within the group.

The effect of a rise in β is determined by two factors: First, if tax preferences change a lot within a group, this decreases that group's power in the political struggle as their median voter is quickly swapped with a new median voter that to a large extent accommodates the preferences of the other group. Second, the size of each income level in each group determines the number of voters and hence increases political influence. This factor may be divided into two secondary factors, the size of the groups q_A and q_B and the

[9] For simplicity I disregard ties where one of the inequalities would have to hold with equality.

relative size of each income level within the group given by q_i^j/q_i. Hence there are a total of three factors to take into account. However, if we have an infinite number of income groups, i.e. a continuous income distribution, I will show below that the effect of group size exactly offsets the effect of changes in preferences. Then what matters is the relative size of each income level within the group. If this is high close to the median income of society, the group is influential.

3.2 Continuous income distributions

Although the analysis becomes somewhat more involved, the case of continuous income distributions is more realistic and also provides additional insights. Call the marginal density functions associated to F_A and F_B f_A and f_B. Assume that there are no holes or mass points so that $0 < f_i(x) < \infty$ for all $i \in \{A, B\}$ and $x \in \Omega$; deviations from this assumption are discussed in Appendix A. Differentiation of the system (9) with regard to β yields

$$S_{tt}^A dt + (1-\alpha)\frac{\partial S_t\left(t, D_{x_A^m}\right)}{\partial x_A^m} dx_A^m + \alpha S_t\left(t, F_A - F\right) d\beta = 0 \tag{12a}$$

$$S_{tt}^B dt + (1-\alpha)\frac{\partial S_t\left(t, D_{x_B^m}\right)}{\partial x_B^m} dx_B^m + \alpha S_t\left(t, F_B - F\right) d\beta = 0 \tag{12b}$$

$$q f_A\left(x_A^m\right) dx_A^m + (1-q) f_B\left(x_B^m\right) dx_B^m = 0 \tag{12c}$$

where

$$S_{tt}^i = S_{tt}\left[t, (1-\alpha) D_{x_i^m} + \alpha\beta F_i + \alpha(1-\beta) F\right] < 0,\ i \in \{A, B\}.$$

Define

$$\hat{w}_A = \frac{s_A q f_A\left(x_A^m\right)}{s_A q f_A\left(x_A^m\right) + s_B(1-q) f_B\left(x_B^m\right)} \qquad s_A = -\left(\frac{\partial^2 u\left((1-t)x_A^m + T(t)\bar{x}\right)}{\partial x \partial t}\right)^{-1}$$
$$\text{and} \tag{13}$$
$$\hat{w}_B = \frac{s_B(1-q) f_B\left(x_B^m\right)}{s_A q f_A\left(x_A^m\right) + s_B(1-q) f_B\left(x_B^m\right)} \qquad s_B = -\left(\frac{\partial^2 u\left((1-t)x_B^m + T(t)\bar{x}\right)}{\partial x \partial t}\right)^{-1}$$

Then the implicit function theorem yields

$$\frac{dt}{d\beta} = -\alpha q(1-q)\frac{s_A f_A\left(x_A^m\right) - s_B f_B\left(x_B^m\right)}{\hat{w}_A S_{tt}^A + \hat{w}_B S_{tt}^B} S_t\left(t, F_A - F_B\right). \tag{14}$$

From this expression, we see that the tax rate is decreasing in β if $s_A f_A\left(x_A^m\right) > s_B f_B\left(x_B^m\right)$ maintaining the assumption that the As are the richer so $S_t\left(t, F_A - F_B\right) < 0$. Consider first the case where $\beta = 0$, so that $s_A = s_B$ and $S^A_{tt} = S^B_{tt}$. Then the incomes of the median voter from the two groups are both the median income in society x^m and

$$\frac{dt}{d\beta} = -\alpha q (1-q) s_A [f_A(x^m) - f_B(x^m)] S_t(t, F_A - F_B). \tag{15}$$

This expression is negative if the density of the distribution within group A is higher than that within group B at the median of income distribution, as was discussed at the end of last section. When β rises marginally from $\beta = 0$, the A-median voter care less about group B, and consequently prefer a lower tax rate whereas the B-median voter now cares less about group A and therefore prefers a higher tax rate. Consequently, as β increases, the median voters will be an A-agent with endowment $x^m_A < x^m$ and a B-agent with endowment $x^m_B > x^m$. Notice that this change is preferences is very similar to the one discussed by Persson and Tabellini (1994: 168f). If $f_A(x^m)$ is small, $|x^m_A - x^m|$ will be large relative to $|x^m_B - x^m|$, so the A-median voter will be poor relative to the former median voter. Although she has a tendency to prefer low tax rates since $\tau(F_A) < \tau(F)$, this tendency is weakened by her wish to have high transfers because she is poor. To summarize, we have the following first main result:

Proposition 1 *When group A is richer than group B in the sense of first order stochastic dominance, then a rise in the degree of group antagonism β decreases the politically chosen tax rate if $s_A f_A(x^m_A) > s_B f_B(x^m_B)$ where x^m_i are the incomes of the median voters and s_i is given by (13). At the initial point $\beta = 0$ this condition simplifies to $f_A(x^m) > f_B(x^m)$.*

To graphically illustrate the effect, consider the function

$$Z(t, F) = 1 - F(x) \text{ where } S_t(t, (1-\alpha) D_x + \alpha F) = 0, \tag{16}$$

which gives the fraction of the population that prefers a tax rate below t in the case without group antagonism. We have similar functions for group A and B in the case with full group antagonism; their densities are illustrated in Figure 1. The chosen tax rate in the case without group antagonism t_0, is determined as $Z(t_0, F) = 1/2$. In the antagonized case, the tax rate is determined by the equation

$$qZ(t, F_A) + (1-q) Z(t, F_B) = 1/2.$$

The initial median voter from group A prefers the tax rate $t_A < t_0$ when group antagonism is full. Hence a mass $Z(t_0, F_A) - Z(t_A, F_A)$ of A-voters change from being in favour of a tax rate above t_0 to a tax rate below t_0. This mass corresponds to the area $\mathcal{A}$. Similarly, a mass of B-voters corresponding to the area $\mathcal{B}$ used to be in favour of a tax rate below t_0, but now prefers a tax rate above. Hence the chosen tax rate will decrease if $q\mathcal{A} > (1-q)\,\mathcal{B}$. This is the case if (14) is negative. As mentioned above, the sign of the effect of a marginal change in β does not depend on q; since $F = qF_A + (1-q)\,F_B$, the functions $Z(t, F_A)$ and $Z(t, F)$ will be close when q is large. This effect perfectly offsets the effect of group A being numerically important. We may say that the impact of q is already taken into account in F. What is important for the effect on taxation is the influence of each group relative to the weight the social planner would put on each of them. However, the magnitude of the effect of antagonism depends on the degree of polarization $q\,(1-q)$.

Figure 1 about here

Whether $f_A(x^m) - f_B(x^m)$ is positive or negative will depend on the shape of the income distributions and the endowments of the median voters. At $\beta = 0$, both median voters have the same endowment x^m. However, since the As are richer than the Bs, the median voter from group A is in a lower income fractile than the one from group B. If the shape of the distribution for the As and the Bs are relatively similar and skewed, this usually implies that $f_A(x^m) - f_B(x^m)$ is positive. Although it is not difficult to find distributions such that $f_A(x^m) - f_B(x^m)$ is not positive, I believe it is at least only slightly negative in most real world cases. Obviously, this is an empirical question. Below, I present some evidence based on US data that supports my claim.

Furthermore, except for very low incomes, both f_A and f_B are likely to be decreasing functions. As β increases, x_A^m declines and x_B^m rises, which imply that $f_A(x^m)$ rises and $f_B(x^m)$ declines. As we shall see below, as β increases, the requirement for a negative effect on the tax rate is more likely to be satisfied.

The group weights s_A and s_B will also play a role for $\beta > 0$. These variables give the change in the effect of increased income on tax preferences, and their relative magnitudes depend on the third derivative of the utility function. The effects of increased income on s_A and s_B is somewhat unclear, although they are likely to be increasing in income in most cases, which pulls in the opposite direction of the effects described above. However, this effect is normally quite small, so I do not believe this effect will dominate.

We see from equation (14) that the magnitude of the term depends on $q(1-q)$, the Herfindahl measure of fractionalization. This easily extends to the case of multiple groups. Hence we have the following result:

Proposition 2 *When the conditions for Proposition 1 holds, then conditional on the group income distributions and the degree of group antagonism, increased fractionalization increases the effect of group antagonism on taxes.*

Corollary 3 *When the conditions for Proposition 1 holds, a society with positive group antagonism will ceteris paribus have lower taxes the higher the degree of fractionalization is.*

This Proposition extend Alesina, Baqir, and Easterly's (1999) and Miguel and Gugerty's (2003) results on public good provision to redistribution.

3.3 Some evidence on the density at the median

It was seen above that the effect of fractionalization and group antagonism, given by equations (14) and (15), depends crucially on the difference between the densities at the median for the groups. I argued that the density would be higher for the richest group. To study the realism of the assumption, I performed some calculations on US income distributions using data from the US Census Bureau (2001: Table A-1). Figure 2 shows estimated income distributions for Blacks and Whites for 2001[10]. The effect of increased fractionalization when $\beta = 0$ (no group antagonism) will depend on the difference at the mean income of the entire population, which is seen to be higher for Whites than for Blacks. As β increases, the relevant densities are to the left of the median for the Whites and to the right of the median for the Black, reenforcing the effect. I have performed similar calculations for the years 1967 to 2001. A summary of the results are presented in Appendix B. The finding is that for all these years, the density for Whites is higher than that for Blacks. Hence for the US, the models quite clearly predicts that a rise in

[10]Data on income fractiles for Blacks and Whites are taken from US Census Bureau (2001: Table A-1). The cumulative density function of the income distribution is then approximated by a cubic spline and densities are found by differentiation. Micro data for 2000 from the LIS give almost identical results.

the degree of group antagonism should lower the support for redistribution.

Figure 2 about here

4 Fractionalization and total welfare

4.1 The simple case

The effects of fractionalization on taxes is interesting in itself. However, it is also interesting to study how fractionalization affects social welfare through the choice of public policy. Consider first the simple case with only two income levels studied in Section 3.1. A benevolent social planner would put weight $\psi^* = q^l/q^h$ on the low-income group and weight unity on the high-income group. The inefficiency of the election-decided tax rate stems in the class society from the poor unduly neglecting the welfare of the rich and vice versa. In the group society, it stems from each group neglecting the welfare of the other. The magnitude of the inefficiency afflicted by the median voter, who puts weight ψ on the low-income group, depends on the magnitude of $|\psi/\psi^* - 1|$. For all parameter values, $\psi_B^l > \psi^*$ and $\psi_A^h < \psi^*$. Since ψ_B^l is increasing and ψ_A^h decreasing in β, increased fractionalization is always detrimental for total welfare if the median voter belongs to one of these groups. In the other cases, things are a bit more complex. We have

$$\psi_A^l > \psi^* \Leftrightarrow (1-\alpha)\frac{q_A}{q^l} - \alpha\beta\left(\frac{q_A^h}{q^h} - \frac{q_A^l}{q^l}\right) > 0 \tag{17}$$

$$\psi_B^h < \psi^* \Leftrightarrow (1-\alpha)\frac{q_B}{q^h} - \alpha\beta\left(\frac{q_B^l}{q^l} - \frac{q_B^h}{q^h}\right) = (1-\alpha)\frac{q_B}{q^h} - \alpha\beta\left(\frac{q_A^h}{q^h} - \frac{q_A^l}{q^l}\right) > 0. \tag{18}$$

If (17) holds, the poor As put too much weight on the poor relative to the social optimum. An increase in the degree of group antagonism (increased β) will make the median voters care more about the As than the Bs as ψ_A^l is decreasing in β. Since there are more rich As then Bs, this implies that they put less emphasis on the poor, and hence approaches the optimal weights. This is illustrated in Figure 3, where it is seen that maximization of a weighted average of the median voter's private utility and the welfare of group A leads to a better outcome than maximization of a weighted average of the private utility and social welfare even though the objective is maximization of social welfare. A similar argument may be made for the rich Bs.

Figure 3 about here

What is striking in expressions (17) and (18) is that unless voters are pure altruists, these conditions will always be fulfilled for $\beta = 0$. This means that unless the median voter belongs to one of the extreme groups, some group antagonism is always good. However, the higher is β, the more likely it is that (17) and (18) don't hold any more, so a very high degree of antagonism is often not ideal neither. Also, as we shall see below, this result is an artefact of this particular economic structure and does not necessarily hold in the more general case. However, the lower is the degree of social conscience, the higher is the bias of the median voter's preferences towards her own needs, and the more useful is group antagonism to pull her preferences in the right direction.

4.2 The general case

Let us now consider the case of a general income distribution studied in Section 3.2. In the case of partial group antagonism, the first order condition for a median voter from group A is

$$S_t\left(t, (1-\alpha) D_{x_A^m} + \alpha\beta F_A + \alpha(1-\beta) F\right) = 0 =: S_t(t, F) + \Psi(t) \tag{19}$$

where

$$\Psi(t) = (1-\alpha) S_t\left(t, D_{x_A^m} - F\right) + \alpha\beta(1-q) S_t(t, F_A - F_B), \tag{20}$$

and of course a similar expression holds for a median voter from group B. The first term of Ψ is the effect of the median voter caring more about herself than other individuals in society and the last term stems from the median voter caring more for group A than group B. It is clear that the absolute value of the second term is increasing in β. It is seen that for $\alpha = 1$, the first term disappears and it follows that group antagonism is necessarily bad. For $\alpha = 0$, on the other hand, antagonism does not matter.

Differentiation of (20) with regard to β yields

$$\frac{\partial \Psi(t)}{\partial \beta} = (1-\alpha) \frac{\partial S_t\left(t, D_{x_A^m}\right)}{\partial x_A^m} \frac{dx_A^m}{d\beta} + \alpha(1-q) S_t(t, F_A - F_B). \tag{21}$$

Inserting (15) into (12a), we get at $\beta = 0$

$$\frac{dx_A^m}{d\beta} = \frac{\alpha}{1-\alpha}\left(\frac{\partial S_t\left(t, D_{x_A^m}\right)}{\partial x_A^m}\right)^{-1} S_t\left[t, \left(w_A - 1\right) F_A + w_B F_B\right], \tag{22}$$

where I have assumed that f_A and f_B exist and are strictly positive in a neighbourhood of x^m. Hence, at $\beta = 0$ we have

$$\frac{\partial \Psi(t)}{\partial \beta} = \alpha q(1-q)\frac{f_A(x^m) - f_B(x^m)}{q f_A(x^m) + (1-q) f_B(x^m)} S_t\left[t, F_A - F_B\right]. \tag{23}$$

It is also seen that at the chosen tax rate,

$$\frac{\partial \Psi(t)}{\partial \beta} = -S_{tt}\frac{\partial t}{\partial \beta}.$$

Following the discussion above, we should expect $\Psi(t)$ to be decreasing in β in most reasonable cases. If $S_t(t, D_{x^m} - F) > 0$, i.e. the original median voter privately prefers a tax rate above the social optimum, then at least some antagonism enhances the economic efficiency by lowering the tax rate. If the median voter prefers a tax rate that is too low, then antagonism is detrimental to efficiency.

Consider the case of an A-voter; the case is symmetric for a B-voter. In most cases, the median voter privately prefers a higher tax rate than the social optimum, which corresponds to the first term in (20). However, the As are richer than the Bs, so if there is group antagonism, an A-median voter will care about the tax-averse As rather than the whole of the population. This may then act as a counter-weight to the median voter's preferences for a tax rate above the social optimum. This is illustrated in Figure 3. However, the median voter may also prefer a tax rate below the social optimum. In that case, the second term in (20) tends to increase this bias. A rise in β has two effects. The A-median voter becomes poorer, and hence privately prefers a higher tax rate. At the same time, she puts more weight on the As and less on the Bs. This effect tends to reduce her preferences for high tax rates. It is impossible to say which effect dominates in the general case. Since the median voter could have preferences both above and below the social optimum, it is clear that there are both cases where increased group antagonism increases efficiency and reduces it.

5 Income distribution and the size of government

We can use the results obtained above to study the effects of increased inequality in fractionalized societies. Consider first the effect of increased intra-group inequality. Consider the completely case of full group antagonism given by the system (7). An increase in inequality may be studied as a mean preserving spread which is equivalent to second order stochastic dominance.. If the income distribution of group i changes from F_i^0 to F_i^1, inequality has increased if F_i^0 second order stochastically dominates F_i^1. It is easy to show that under general conditions, this implies that the median voter of group i now prefers a higher tax rate.[11] Consequently, if inequality increases in one or both groups, the size of government increases. It is easily seen that if inequality increases in one group, it also increases in society as a whole. Hence the median voter in group i also prefers a higher tax rate in cases with less then full group antagonism. These results are very similar to those found in the ordinary Romer-Roberts-Meltzer-Richard model.

An increase in inter-group inequality is more interesting. Assume that initially, both groups have the same income distribution F. An increase in inter-group inequality is a situation where the groups A and B get the income distributions F_A and F_B where F_A first order stochastically dominates F_B. For analytical simplicity, I will concentrate on a continuous transition between the two states where group $i \in \{A, B\}$ has the income distribution $\tilde{F}_{\gamma i} := \gamma F_i + (1-\gamma) F$ with marginal densities $\tilde{f}_{\gamma i}$, which are assumed to take finite and strictly positive values for all incomes in Ω. Then we keep the economy-wide income distribution F fixed, but increase the difference between the groups. $\gamma = 0$ corresponds to the initial state and $\gamma = 1$ to the final state. When we limit our attention to the case of full group antagonism, the politically chosen tax rate t satisfies the following system, similar to the equations studied in Section 3.2:

$$S_t\left(t, (1-\alpha) D_{x_A^m} + \gamma\alpha F_A + (1-\gamma)\alpha F\right) = 0 \tag{24a}$$

$$S_t\left(t, (1-\alpha) D_{x_B^m} + \gamma\alpha F_B + (1-\gamma)\alpha F\right) = 0 \tag{24b}$$

$$q\tilde{F}_{\gamma A}\left(x_A^m\right) + (1-q)\,\tilde{F}_{\gamma B}\left(x_B^m\right) = \frac{1}{2}. \tag{24c}$$

As γ enters (24c), analysis of this system is slightly more involved than of (9) However, I

[11] A sufficient condition is that $\frac{\partial}{\partial t} u\left[(1-t)\,x + T(t)\,\bar{x}\right]$ is decreasing and concave in x for all x, a result that is well-known from the theory of choice under uncertainty.

will show that the results are almost identical. The implicit function theorem yields

$$\frac{dt}{d\gamma} = \Xi \left\{ \frac{(1-\alpha)\Gamma}{s_A q \tilde{f}_{\gamma A}(x_A^m) + s_B (1-q) \tilde{f}_{\gamma B}(x_B^m)} \right. \tag{25}$$
$$\left. +\alpha q(1-q)\left[s_A \tilde{f}_{\gamma A}(x_A^m) - s_B \tilde{f}_{\gamma B}(x_B^m)\right] S_t(F_A - F_B) \right\}.$$

where

$$\Xi = -\frac{s_A q \tilde{f}_{\gamma A}(x_A^m) + s_B (1-q) \tilde{f}_{\gamma B}(x_B^m)}{s_A q \tilde{f}_{\gamma A}(x_A^m) S_{tt}^A + s_B (1-q) \tilde{f}_{\gamma B}(x_B^m) S_{tt}^B} > 0, \tag{26}$$

$$\Gamma = q(F_A - F)(x_A^m) + (1-q)(F_B - F)(x_B^m), \tag{27}$$

and s_i is given by (13). The traditional Romer-Richard-Meltzer-Richard model is obtained by letting $\alpha = 0$. Then the effect on the size of government of an inter-group rise in inequality is given by the sign of Γ, which corresponds to the effect of the change in the median endowment of the society when intra-group inequality rises.

When group A is richer than B in the sense that F_A first order stochastically dominates F_B, it follows that $S_t[t, F_A] < S_t[t, F_B]$. Furthermore, as I argued above, it is probable that $f_A(x_A^m) > f_B(x_B^m)$. If the overall income distribution is single-peaked and skewed to the right, then $f(x_A^m) > f(x_B^m)$ and hence $\tilde{f}_A(x_A^m) > \tilde{f}_B(x_B^m)$. Then the square brackets in the second term in (25) is positive, so the second term is negative.

Hence if we can show that $\Gamma \leq 0$, we would have established that $dt/d\gamma < 0$. The sign of Γ is, however, a bit involved. It is negative if the proportion of the As that has incomes in the interval $[x_A^m, x_B^m]$ is larger than the corresponding proportion of the Bs as we may write

$$\Gamma = q(1-q)\left\{\left[F_A(x_A^m) - F_A(x_B^m)\right] - \left[F_B(x_A^m) - F_B(x_B^m)\right]\right\}.$$

At $\gamma = 0$, we have $\Gamma = 0$ and

$$\left.\frac{\partial \Gamma}{\partial \gamma}\right|_{\gamma=0} = q(1-q)(f_A - f_B)(x^m)\left(\left.\frac{\partial x_A^m}{\partial \gamma}\right|_{\gamma=0} - \left.\frac{\partial x_B^m}{\partial \gamma}\right|_{\gamma=0}\right),$$

which is negative when $(f_A - f_B)(x^m) > 0$, the usual higher density at the median-condition. Hence for small values of γ, $\Gamma \leq 0$. Furthermore, differentiation of (24c) and rearranging yields

$$\gamma \frac{\partial \Gamma}{\partial \gamma} = -\Gamma - \left[q f_A(x_A^m) \frac{\partial x_A^m}{\partial \gamma} + (1-q) f_B(x_B^m) \frac{\partial x_B^m}{\partial \gamma}\right].$$

The first term is equilibrating and tends to keep Γ close to zero. Inserting from (24a) and (24b), the term in square brackets may be rewritten

$$\frac{-1}{1-\alpha}\left[qs_Af_AS_{tt}^A+(1-q)\,s_Bf_BS_{tt}^B\right]\frac{dt}{d\gamma}$$
$$-\frac{\alpha}{1-\alpha}q\,(1-q)\,(s_Af_A-s_Bf_B)\,S_t\,(t,F_A-F_B)\,.$$

Here, the first term will also be equilibrating as we only can have $dt/d\gamma>0$ if $\Gamma>0$, and the second term negative as long as $s_Af_A>s_Bf_B$. When this is true, $d\Gamma/d\gamma<0$ as $\Gamma\leq 0$ in a neighbourhood of $\gamma=0$ and $d\Gamma/d\gamma<0$ for all $\Gamma>0$. Consequently, both terms in curly brackets (25) are negative, so $dt/d\gamma<0$.

This means that because the society is fractionalized, there is a tendency towards reduced tax rates when the inter-group inequality rises. If the rate of social conscience is not too low, we can expect a rise in inter-group inequality to reduce the size of government, also if there is a rise in inter-group inequality at the same time. Hence we have the following result:

Proposition 4 *When group A is richer than group B in the sense of first order stochastic dominance, a mean preserving between group spread in the income distribution decreases the politically chosen tax rate if $s_Af_A>s_Bf_B$, i.e. when the conditions for group antagonism decreasing the tax rate outlined in Proposition 1 holds.*

6 Fractionalization and the party system

Although I alluded to a Downsian party system above, political parties were not discussed properly. For the machinery above to work, we either need the tax rate to be the only political issue or to be decided on independently of all other issues. However, this is highly unrealistic. In heavily fractionalized countries, ethnic parties seem to flourish. This indicates that other issue dimensions are important. Since there will usually be a number of other policy issues than the tax levels to which different ethnic groups have different opinions, this observation is unsurprising. To accommodate this, Collier (2001) considers a model where members of one ethnic group always votes for her own group's party, and where the party programs are determined within the ethnic group.

Without going into detail, I will present an extension of the model above where voters have preferences for what I will label the ethnicity of the chosen policy in addition to tax rates. Ethnicity may include a range of choices regarding linguistic, religious, and moral questions as well as protection of minorities, and is assumed to be an element of some metric space. Let us now assume that a voter from group i with endowment x has a utility function

$$V_i(t, E; x) = U_i(x, t) - \phi d(E, E_i) \tag{28}$$

where d is a metric on the space of ethnic policies, E is the chosen policy, E_i is the ethnic policy preferred by group i, and U_i is the utility function defined in (6). The parameter ϕ indicates how important ethnicity-related issues are to voters. The model in Section 2 corresponds to $\phi = 0$, that is, a case where there are no differences between different ethnic policies that matters to voters. Collier's (2001) analysis corresponds to $\phi \to \infty$, where a voter could never vote for a party advocating the policies of other groups than her own. Some indifference curves for this utility function are shown in Figure 4, where for purposes of visualization, the space of ethnic policies is assumed to correspond to the real line. The curves are for an A-voter with preferred tax rate t^*. She will prefer to vote for a party of her own ethnicity as long as it advocates a tax rate in the interval $(\underline{t}, \bar{t})$. If there are no parties of her own ethnicity within this interval, she may consider voting for a party of the other ethnicity. The higher is ϕ, the larger is the height of an indifference curve relative to its width. In the limiting case of $\phi \to \infty$, the interval $(\underline{t}, \bar{t})$ would cover the real line whereas it would collapse to a single point as $\phi \to 0$.

Figure 4 about here

If we allow for sequential voting, the effect of voting over E will vanish independently of the voting order and the results obtained in previous sections persist. However, if we introduce simultaneous voting or a parliamentary system, this is generally no longer true. The utility function (28) implies preferences over two non-parallel political issues. Hence we can no longer use the median voter theorem, and in the general case, political equilibria will be unstable. The case of $\phi = 0$ is the one we have already studied. In the case of $\phi \to \infty$, we can imagine a four party system with two parties belonging to each group. All voters belonging to group i will consider parties from the other group as worse than any i-party and hence the two i-parties will share the i-voters among themselves. It is then natural to use the median voter in each of the two groups, so the two i-parties will end up with the same program for a tax rate corresponding to the preferred tax rate of the median voter within group i. Since both i-parties have equal platforms, it is highly probable that they will form a governing coalition if their group is the larger. Regrettably, it follows that if there are more than two groups, parliamentary decision making is more complicated and less predictable. In the two-group case, the tax rate may be said to be determined by the preferences of the median voter of the largest group. Assume that group A is the largest group and x_A^m is the median income in group A. Then the chosen tax rate in the case of partial group antagonism is $\tau\left((1-\alpha)\, D_{x_A^m} + \alpha\beta F_A + \alpha\,(1-\beta)\, F\right)$. We see that most of the results of an increase in β obtained in Section 3 still hold. However, since group A is the sole decisive group, the value of β does not influence the endowment of the pivotal voter, so the analysis is somewhat simpler. If group A is the richest group, then an increase in β will reduce the tax rate since all A-voters put more emphasis on the welfare of group A which advocates a lower tax rate than group B. If the median voter's privately preferred tax rate is above the social optimum, then an increase in β is efficiency enhancing, otherwise it is not. This will depend on how large the income difference between group A and B are and how skewed the distributions are. Unfortunately, for the case of $\phi \in (0, \infty)$ there is no simple solution to the outcome of simultaneous voting. However, it is very likely that the outcome is somewhere between the two extreme cases.

If we look at stable democracies, it seems that most two-party systems, particularly the UK and the US, fit my initial model relatively well. This is also true for the Scandinavian countries although one may argue that there is a rural-urban/religious issue that perturbs the system somewhat. In the latter case, however, the reason may be that the degree of group antagonism is limited and the difference between different groups is small. Some of the continental European countries, on the other hand, cannot be understood without taking group-specific policies into consideration. In some of these countries, the groups have almost their own societies within the society, with of course their own political parties. This may seem to fit well to Colliers model. However, the result is generally not that the largest group can dictate the others. Rather, decision making is consensus based and minorities have constitutional protections.

7 Testing the model

7.1 The data

In this section I report results from some estimations to study the validity of some of the model's main predictions. It would be interesting to study the effect of group antagonism β on support for redistribution. However, at the time being I don't know any method to measure β, so I will limit the test to the following somewhat simpler predictions:

1. For a given level of group antagonism, a higher degree of fractionalization leads to less redistribution (Proposition 2)

2. Within group inequality should increase the support for redistribution (Proposition 3)

3. Between group inequality should reduce the support for redistribution (Proposition 3)

To perform the tests, I employ a panel of US states with six observations per state.[12] The main reason for using a single country is that the definition of groups and the collection of data on groups are more homogeneous. We need measures of inequality both between and within groups. As such data are not readily available, I had to construct the measures from micro data. Income data are taken from March Current Population Survey, made available through the Luxembourg Income Study (LIS).[13] For purposes of politically determined tax rates, the relevant measure of income is pre-tax factor income. Household incomes are normalized according to the square root equivalence scale. As we want to decompose inequality into within- and between-group inequality, it is desirable to use a decomposable inequality measure. Requiring the transfer principle and independence of scale to hold, we are left with the class of generalized entropy measures

$$I_{GE}^{\kappa} = \frac{1}{\kappa(\kappa-1)} \int \left[\left(\frac{x}{\mu} \right)^{\kappa} - 1 \right] dF(x),$$

[12]The states are observed in 1969, 1974, 1986, 1991, 1994, 1997, and 2000. Although 1979 is also available from the LIS, these data lack information about state of residence, rendering them useless. Furthermore, I do not have data on average share of transfers to disposable income for 1969.

[13]See http://www.lisproject.org for details.

where F is the CDF of the income distribution, μ the mean income, and κ a parameter (Bourguignon 1979; Shorrocks 1981). The higher is κ, the more weight the measure puts on inequality in the upper range of the income distribution. I concentrate on $\kappa = 0$, which should capture the inequality close to the median reasonably well. Then we have $I_{GE}^{0} = -\int \ln\left(\frac{x}{\mu}\right) dF(x)$, the mean logarithmic deviation.

I use two measures of redistribution. The first is the average share of transfers received by households as a share of disposable income, calculated from the LIS data. This also includes federal transfers, but this should not be an obstacle for the relevant tests. The second measure is state expenditure on public welfare as a share of state personal income. Data on public welfare is taken from *Government finances* (US Department of Commerce, various years) whereas state personal income is from the Bureau of Economic Analysis.[14]

To measure group fractionalization, I use the conventional Herfindahl measure which gives the probability that two randomly selected persons belong to different groups. The groups are African American, white, and other in 1969, African American, Spanish, white, and other in 1974 and 1986, and African American, American Indian/Aleut/Eskimo, Asian/Pacific Islander, Hispanic white, non-hispanic white, and other thereafter. The fractionalization index is calculated from the LIS data used for calculating the between-group inequality measure. This is to avoid the inequality measure picking up elements of the fractionalization measure. Comparing my fractionalization values with values obtained from the 1990 census, I get an overall correlation of .87, ranging from .67 in 1969 to .98 in the 1990s. This indicates that my measure should be appropriate. Data on the fraction of the population above 65 is also derived from the LIS data.

Table 1 about here

Figures 5 to 8 about here

Table 1 gives basic descriptive statistics of the data and Figures 5 to 8 show the geographical distribution of fractionalization, within- and between group inequality, and average transfers as a share of disposable income. For the figures, all numbers are measured in 2000. We notice that the degree of fractionalization follow quite similar patterns with high values in the South and South-West. Within group inequality is uncorrelated

[14] Available at http://www.bea.doc.gov/bea/regional/spi/

with between group inequality (the correlation coefficient is -.05) and does not seem to follow any strong geographical patterns. Finally, transfers are generally high in the Midwest and the North East.

7.2 Empirical results

Table 2 shows the main empirical results. In column (1) to (7) the dependent variable is the average share of transfers in household disposable income. The first thing we notice is that overall factor income inequality seems to induce higher transfers, as predicted by the Romer-Roberts-Meltzer-Richard model. A one standard deviation increase in inequality increases the fraction of transfers by .016 or about half a standard deviation, which should be judged a quite large effect. This result is also strongly significant in the fixed effects panel data model reported in column (2). Fractionalization seems to have a negative effect on transfers. A one standard deviation increase in fractionalization reduces transfers by about 0.005 or about 0.15 of a standard deviation. Hence the magnitude of this effect is far smaller. This effect does not seem to be robust to the introduction of state fixed effects. As fractionalization changes little over time, this is not surprising. Furthermore, the positive coefficient on fractionalization in column (2) is mainly due to a few outliers, most importantly Idaho 1974. Non-reported robust regressions also confirm this.

Table 2 about here

According to the results discussed in Section 5, within group inequality should increase redistribution whereas between group inequality should reduce it. In column (3) I split inequality into within and between inequality. We see that the estimates conform to the expectations from the theoretical model, although the coefficient on between group inequality is not significantly different from zero. However, the two parameters are significantly different from each other at the 5% level of confidence. We also notice that the coefficient on within group inequality when we control for between group inequality is numerically larger than the coefficient on overall inequality. Hence aggregating between and within inequality tends to hide some of the effect of within group inequality on redistribution. Introducing state fixed effects give almost identical results.

One may worry that the results are driven by a few outliers. To check this, I rerun some of the results using median regressions instead of least squares, reported in columns

(5) to (7). The changes in the estimates are not dramatic, and the overall conclusions persist. As a fixed effects estimator for median regression has not yet been developed, I introduce eight Division dummies to partially pick up state fixed effects. Now, between group inequality gets a positive effect on transfers, but still smaller than within inequality. However, the difference is no longer significantly different.

The measure of transfers also contains federal transfers, so it may be argued that it is too broad. Hence I repeated the estimations using the fraction of state welfare expenditure in state personal income as dependent variable. This measure is arguably to limited, but inequality and fractionalization should still have the predicted effects upon it. However, the results are somewhat less appealing. Fractionalization still has a negative effect on transfers, but the effect is hardly significant in any of the specifications. However, total inequality has a positive and strongly significant effect. A one standard deviation in inequality increases welfare expenditure per capita by .0024 or about a quarter of a standard deviation. Although this effect is smaller than for the first measure of transfers, the effect is still important. When we distinguish between between and within inequality, there appear to be little difference between the two. In the state fixed effects specification, between group inequality even has a stronger positive effect than within inequality. However, is seems that this may be driven by outliers. A quite large fraction of the observations have large DFITS. It seems that the District of Columbia is the most important outlier with DFITS above .5 in all years. If we remove it from the sample, we find that between group inequality has a significantly lower effect than within group in equation (10) and the difference is insignificant in equation (11). When we use median regression instead of least squares, the effect of between group inequality is essentially zero, and significantly lower than the coefficient on within group inequality at the 10% level.

To see whether my particular choice of inequality measure may be driving the results, I rerun the basic regressions in columns (1) and (3) using different values for the parameter κ. The results are reported in Table 3. It is seen that the results are essentially the same: Inequality has a significantly positive effects on transfers, and when we decompose into between and within group inequality, within has a somewhat stronger effect whereas the effect of between is about zero. The effect is less strong for $\kappa \neq 0$. However, we also see that the fit of the model as measured by R^2 is highest at $\kappa = 0$, so it may seem that this is the most suitable measure of inequality to explain redistribution.

The table also reports results where I use the Gini coefficient rather than the generalized entropy measure. As the Gini coefficient is not decomposable, column (10) reports results from a regression with total inequality and between group inequality rather than between and within as before. The results are similar to the ones found above, so it does not seem that the results are an artefact of the particular choice of inequality measure.

Table 3 about here

To conclude, the first set of regressions using the share of transfers in household disposable income give strong support for the predictions of the model. When we turn to the fraction of state welfare expenditure, the conclusions are weaker. However, this may to some extent be due to the measure being to limited to capture the total picture of state redistributive efforts.

8 Conclusion

Fractionalization in general, and racial divide in particular, has a major impact on politics. I have shown that it tends to reduce the amount of redistribution in democratic polities. Furthermore, when a society is fractionalized, inequality between and within groups have opposite effects on the support for redistribution. The former will reduce the support and the latter increase it. These predictions also have reasonably good empirical support.

This may also be an explanation for the fact that a many very unequal societies have small governments. The reason is twofold. In the first place, fractionalized countries tend to have a more uneven distribution of income than do less fractionalized cases. As fractionalization reduces the support for redistribution, this implies a negative correlation between inequality and the size of government. Furthermore, inter-group inequality tend to reduce the support for redistribution in fractionalized societies. Hence if both inter- and intra-group inequality is increasing, this might lead to less support for public redistribution. Although most of the analysis was performed within a relatively simple model of policy determination, it seems plausible that most of the main conclusions also hold in richer models. It also supports the view that fragmentation along racial lines is a barrier to policies that benefits the poor in racially divided countries like the US, a view emphasized by e.g. Wilson (1978, 1999).

Observe that if the groups are geographically segmented, it is quite probable that redistribution takes place locally so most of the tax levied from one agent is transferred to her fellow group members. This may to some extent limit the consequences of high fractionalization but excludes possibly beneficial redistribution between groups. One could imagine an extension of the model in this direction, which is closely related to the literature on the optimal size of nations (Alesina and Spolaore 1997, Goyal and Staal 2003).

The theory also has implications for transition to democracy. In countries with heavy fractionalization and intense groups conflicts, it will usually be difficult to obtain democratic support for a large welfare state. Then one has the choice between two paths towards development: On the one hand, one could opt for a small government and little redistribution though central budgets. On the other hand, it may be possible to go through a nation building process where the tension between the groups is reduced and a European style welfare state becomes politically feasible. However, in the long run the degrees of social conscience and group antagonism may also change. A conjecture is that high inequality will tend to reduce social conscience and between group inequality increase group antagonism due to segregation and polarization.

Finally, the introduction of group antagonism and income differences may help identify what dimensions of fractionalization matter for public policy. If antagonism between members of different groups is high, and for the case of redistribution income differences are important, fractionalization along this line will be important. Fractionalization along lines where group antagonism is low will not be important for public policy. One way to measure this could be to study the effect of group belonging on support for redistribution or public policy provision, controlling for income. If group belonging turns out to be important, this would be a sign of the group dimension being an important dimension of fractionalization.

A Mass points and holes in the income distribution

If a cumulative distribution function G has mass points, we cannot simply define the dth fractile as $\{x_d : G(x_d) = d\}$ since there may be no unique x_d for which this holds. For this purpose, I will use the symbol $\ni$. Let us define the relation $\ni$ to mean that

$$G(x_d) \ni d \text{ if } G(x_d) \geq d \text{ and } \lim_{x \to x_d^-} G(x) \leq d. \tag{29}$$

For two CDFs G_1 and G_2, I will also write

$$G_1(x_1) + G_2(x_2) \ni d \text{ if } \begin{cases} G_1(x_1) + G_2(x_2) \geq d \lim G_1(x_1) + G_2(x_2) \ni d \\ \text{and} \\ \lim_{x \to x_1^-} G_1(x) + \lim_{x \to x_2^-} G_2(x) \leq d \end{cases}.$$

If G does not have a mass point at x_d then $G(x_d) \ni d$ implies $G(x_d) = d$. Throughout the paper, the notation may be extended to the case of discontinuous distributions by replacing the equality sign by $\ni$ when defining quantiles. For instance, in this notation, the tax rate preferred by the median voter is found as the solution to the system

$$\begin{cases} S_t(t, (1-\alpha) D_{x^m} + \alpha F) = 0 \\ F(x^m) \ni \frac{1}{2} \end{cases}. \tag{30}$$

If we have hole in the income distribution, this may have an impact of the results of the analysis in Section 3.2. Consider the case where say F_B is constant at x^m, that is, $f_B(x^m) = 0$. Then there is only one median voter belonging to group A. It is also seen that (12c) reduces to $dX_A^m = 0$, so (12a) simplifies to

$$\frac{dt}{d\beta} = \frac{-\alpha}{S_{tt}(t, (1-\alpha) D_{x^m} + \alpha F)} S_t(t, F_A - F),$$

that is, the change in the tax rate is strictly in the direction desired by group A. The reason is simply that in this society, the tax rate is marginally determined by the A-group only, and a slight change in β does not change this situation. However, a non-marginal change in β may permit new coalitions to form and change this result. This case is in fact similar to the case of a mass point for group i at x^m, i.e. $f_i(x^m) \to \infty$, that was analysed in Section 3.1.

B Detailed data on the densities at the median

The table underneath gives details of the density of the income distribution for an income equal to the overall median income for the Blacks and Whites for the last ten years. Median incomes are given in 2001 dollars.

Table A1 here.

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Table 1: Descriptive statistics

Variable		Obs	Periods	States	Mean	Std. dev.	Between std. dev.	Within std. dev
Total inequality	κ=-1	357	7	51	31.72	33.20	8.73	32.05
	κ=0	357	7	51	.570	.134	.047	.125
	κ=1	357	7	51	.353	.076	.029	.070
	κ=2	357	7	51	.290	.103	.039	.096
	Gini	357	7	51	.441	.046	.019	.042
Between group inequality	κ=-1	357	7	51	.077	.547	.202	.509
	κ=0	357	7	51	.015	.026	.013	.023
	κ=1	357	7	51	.012	.015	.010	.011
	κ=2	357	7	51	.007	.009	.007	.006
	Gini	357	7	51	.045	.037	.031	.020
Within group inequality	κ=-1	357	7	51	31.64	33.22	8.77	32.06
	κ=0	357	7	51	.555	.133	.049	.123
	κ=1	357	7	51	.341	.073	.027	.068
	κ=2	357	7	51	.282	.101	.037	.094
Racial fractionalization		357	7	51	.250	.162	.147	.072
Fraction of population above 65		357	7	51	.094	.027	.018	.020
Log per capita income		357	7	51	9.51	.752	.148	.738
Average share of transfers to disp. income		306	6	51	.146	.033	.023	.023
Fraction expenditure on welfare		357	7	51	.024	.010	.007	.008

Inequality is measured by the generalized entropy measure with coefficient κ and the Gini coefficient. Between standard deviations are standard deviations of the state averages and within the average within state standard deviation.

Table 2: Inequality and redistribution

Dependent variable	Average fraction of transfers in disposable income							Fraction expenditure on welfare in per capita personal income						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Fraction above 65	0.675***	0.719***	0.656***	0.698***	0.619***	0.574***	0.635***	-0.032*	-0.022	-0.033	-0.012	-0.026	-0.040**	-0.029
	(0.045)	(0.060)	(0.046)	(0.059)	(0.045)	(0.046)	(0.032)	(0.019)	(0.015)	(0.020)	(0.015)	(0.021)	(0.017)	(0.022)
Log per capita income	-0.064***	-0.063***	-0.065***	-0.060***	-0.057***	-0.058***	-0.075***	0.005**	-0.019	0.005*	-0.020***	-0.002	-0.002	-0.019***
	(0.006)	(0.023)	(0.006)	(0.023)	(0.006)	(0.006)	(0.006)	(0.003)	(0.006)	(0.003)	(0.006)	(0.003)	(0.002)	(0.004)
Fractionalization	-0.028***	0.017***	-0.020***	0.028	-0.032***	-0.027***	-0.034***	-0.004	-0.017**	-0.004	-0.019***	-0.005	-0.003	-0.002
	(0.006)	(0.026)	(0.007)	(0.026)	(0.006)	(0.007)	(0.006)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.002)	(0.004)
Total inequality	0.121***	0.104***			0.130***			0.018***	0.006**			0.018***		
	(0.012)	(0.013)			(0.012)			(0.005)	(0.003)			(0.005)		
Within group inequality			0.128***	0.112***		0.148***	0.105***			0.018***	0.003		0.022***	0.006
			(0.012)	(0.013)		(0.012)	(0.008)			(0.005)	(0.003)		(0.004)	(0.006)
Between group inequality			-0.039	-0.140		-0.018	0.063***			0.018	0.030***		0.002	0.016
			(0.074)	(0.085)		(0.075)	(0.049)			(0.017)	(0.011)		(0.010)	(0.013)
Intercept	0.666***	0.649***	0.669***	0.618	0.589***	0.593***	0.806***	-0.033	0.227**	-0.033	0.241***	0.041	0.044*	0.220***
	(0.065)	(0.236)	(0.065)	(0.232)	(0.066)	(0.065)	(0.059)	(0.028)	(0.059)	(0.029)	(0.059)	(0.032)	(0.023)	(0.042)
Different			-2.190**	-2.900***		-2.150**	-0.830			-0.010	2.330**		-1.800*	0.740
			[0.029]	[0.004]		[0.032]	[0.410]			[0.994]	[0.020]		[0.073]	[0.462]
R^2	0.762	0.716	0.766	0.719	0.538	0.576	0.576	0.425	0.275	0.425	0.266	0.295	0.297	0.400
Observations	306	306	306	306	306	306	306	357	357	357	357	357	357	357
Ind. effects		States		States			Divisions		States		States			Divisions
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	LS	LS	LS	LS	Med	Med	Med	LS	LS	LS	LS	Med	Med	Med

All inequalities refer to the generalized entropy measure with parameter 0. Estimator is either least squares (LS) or least absolute deviations (Med). Different is the t-test of the parameters on between and within group inequality being different. R^2 is overall R^2 for fixed effects models and pseudo-R^2 for median regressions. Omitted categories are 2000 for year-dummies and East North Central for division-dummies.
Standard errors in parenthesis. Significantly different than zero at 90% (*), 95%(**), and 99% (***) confidence. p-values in square brackets.

Table 3: Robustness to the measure of inequalty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
κ	-1	0	1	2	Gini	-1	0	1	2	Gini
Total inequality	.0001***	0.121***	0.110***	0.020	0.216***					0.233***
	(0.000)	(0.012)	(0.024)	(0.016)	(0.040)					(0.417)
Within group inequality						.0001***	0.128***	0.123***	0.023	
						(0.000)	(0.012)	(0.025)	(0.016)	
Between group inequality						-.0002	-0.039	-0.041	-0.074	-0.073
						(0.002)	(0.074)	(0.098)	(0.146)	(0.052)
Different						-0.160	-2.190**	-1.590	-0.650	-1.41
						[0.869]	[0.029]	[0.113]	[0.516]	[0.158]
R^2	0.689	0.762	0.693	0.682	0.709	0.689	0.766	0.704	0.682	0.711
Observations	306	306	306	306	306	306	306	306	306	306
Individual effects	No	No	No	No	No	No	No	No	No	No
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	LS	LS	LS	LS	LS	LS	LS	LS	LS	LS

Dependent variable is the average fraction of transfers in disposable income. The measures of inequality are generalized entropy measures with different parameters κ and the Gini coefficient. Control variables are the fraction of the population above 65, log of per capita income, fractionalization, and year dummies. Different is the t-test of the parameters on between and within group inequality being different. Estimation is by ordinary least squares. Standard errors are in parenthesis, p-values in square brackets. Significantly different than zero at 90% (*), 95%(**), and 99% (***) confidence.

Table A1: Density at the median of the US income distribution for Blacks and Whites

Year	Median income	Density x100	
		Blacks	Whites
2001	42228	1.03	1.05
2000	43162	1.03	1.04
1999	43355	0.96	1.04
1998	42173	0.98	1.07
1997	40699	1.05	1.11
1996	39869	1.04	1.12
1995	39306	1.06	1.16
1994	38119	1.03	1.18
1993	37688	1.06	1.20
1992	37880	1.06	1.20
1991	38183	1.08	1.22
1990	39324	1.06	1.24
1989	39850	1.04	1.18
1988	39144	0.98	1.19
1987	38835	1.04	1.21
1986	38365	1.04	1.23
1985	37059	1.12	1.28
1984	36343	1.12	1.31
1983	35438	1.13	1.35
1982	35423	1.16	1.36
1981	35478	1.11	1.34
1980	36035	1.15	1.35
1979	37192	1.12	1.31
1978	37234	1.17	1.32
1977	34989	1.23	1.39
1976	34792	1.26	1.42
1975	34219	1.32	1.45
1974	35159	1.29	1.46
1973	36278	1.24	1.41
1972	35560	1.25	1.46
1971	34126	1.38	1.53
1970	34481	1.34	1.54
1969	34714	1.39	1.57
1968	33436	1.41	1.65
1967	32081	1.43	1.68

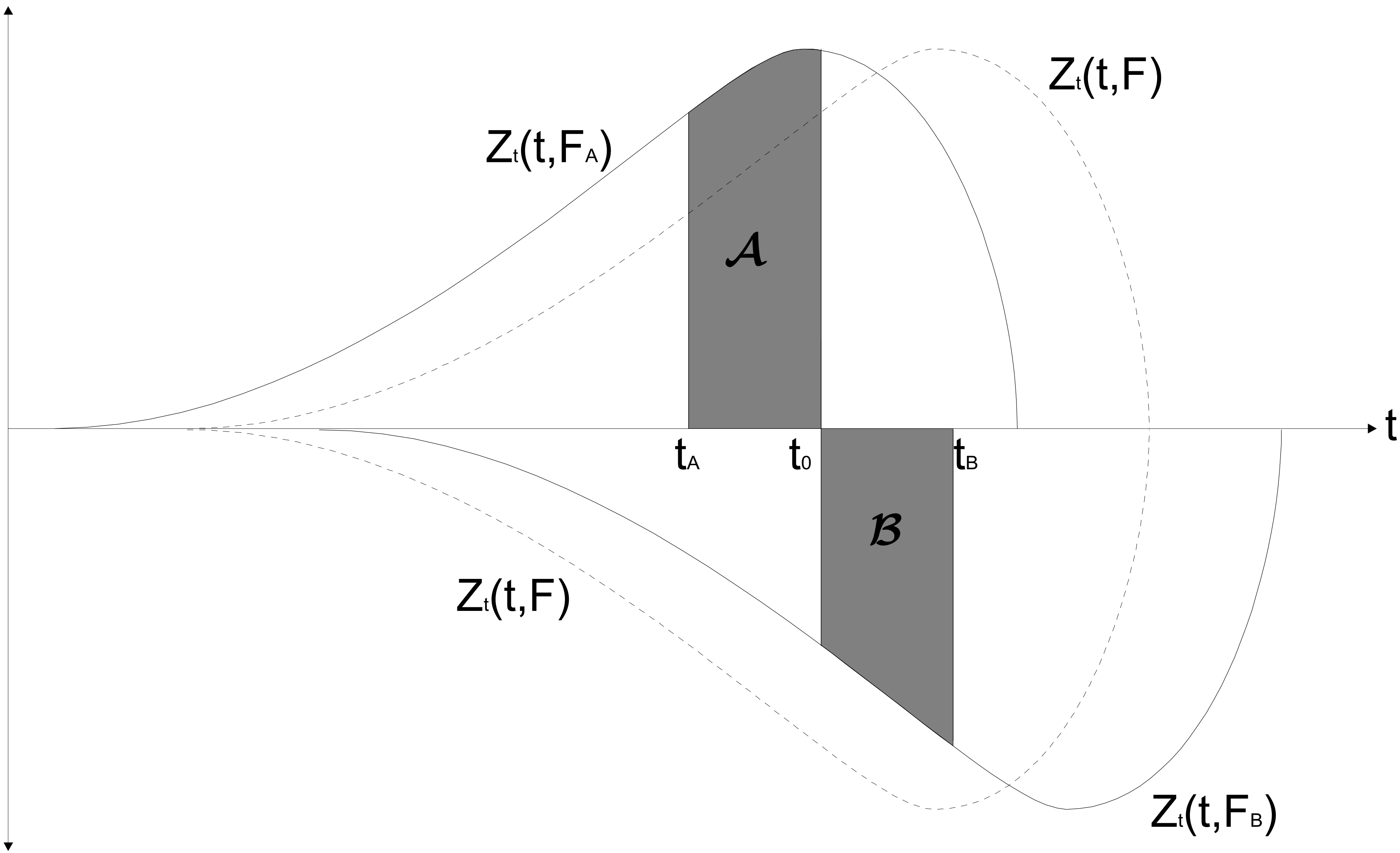

Figure 1: Effect of an increase in group antagonism β

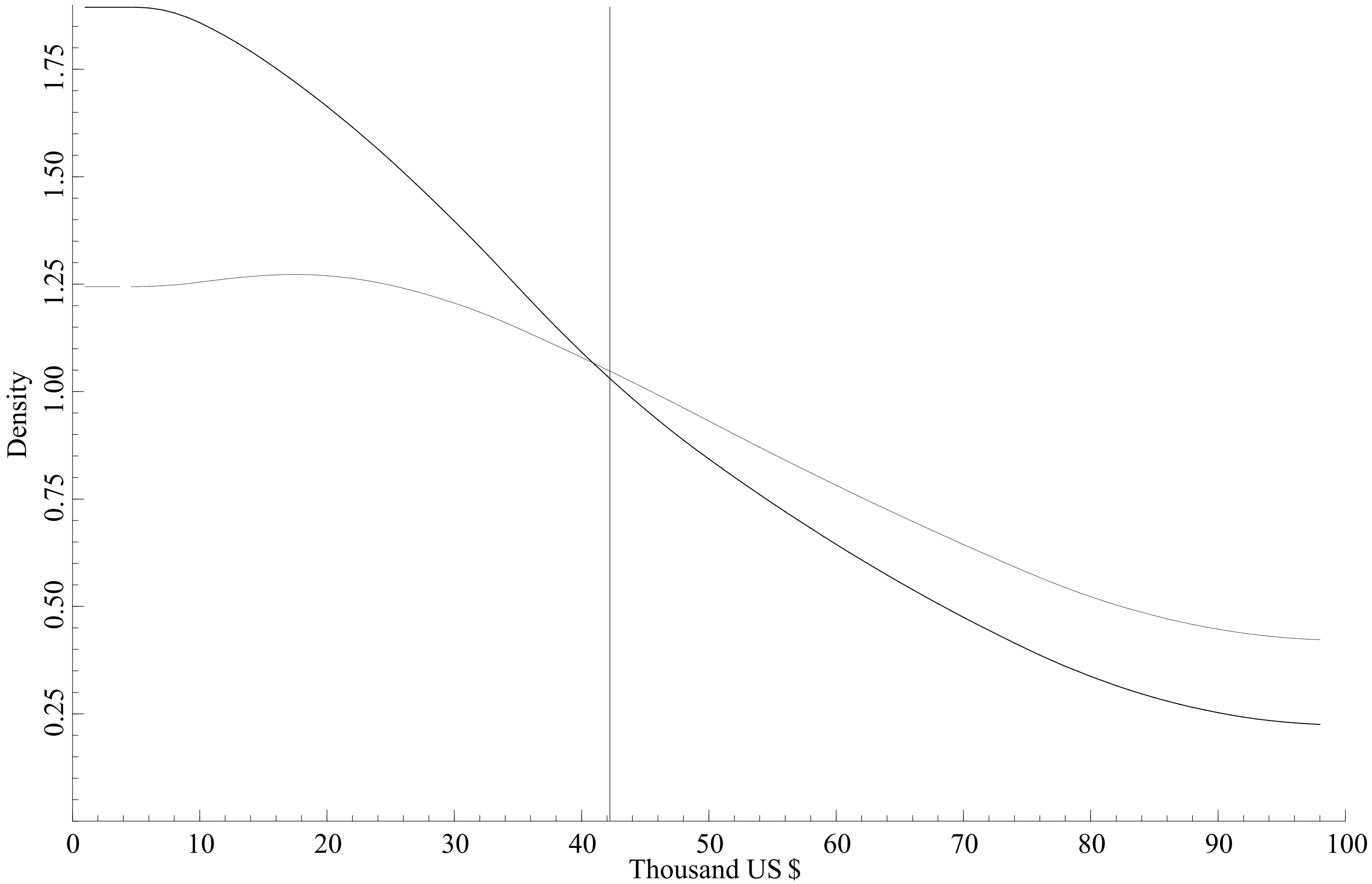

Figure 2: Estimated income distributions for Blacks and Whites, USA 2001.
Continuous line is for Blacks, dashed line for Whites. The vertical line is the overall median income.

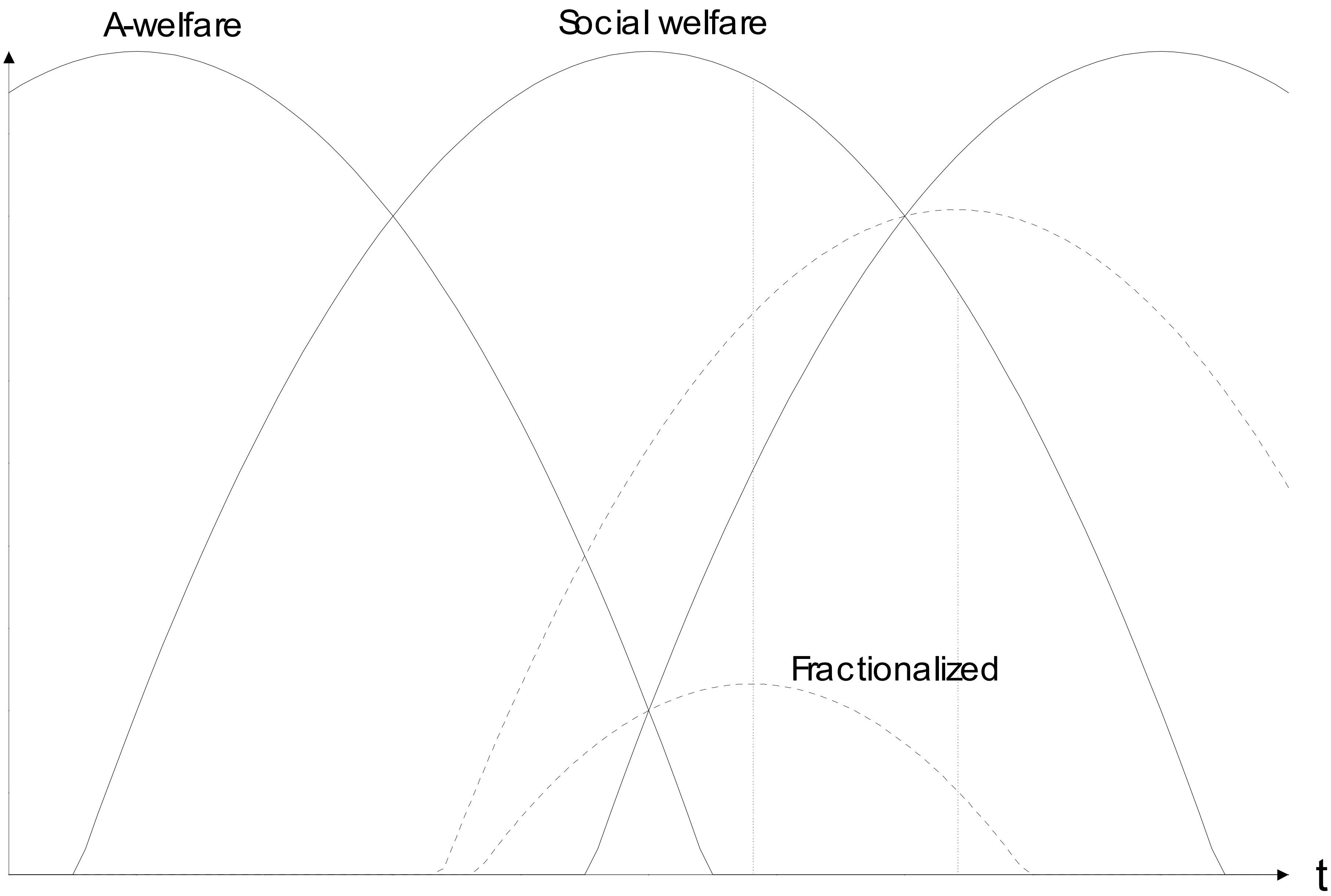

Figure 3: The effect of fractionalization on social welfare

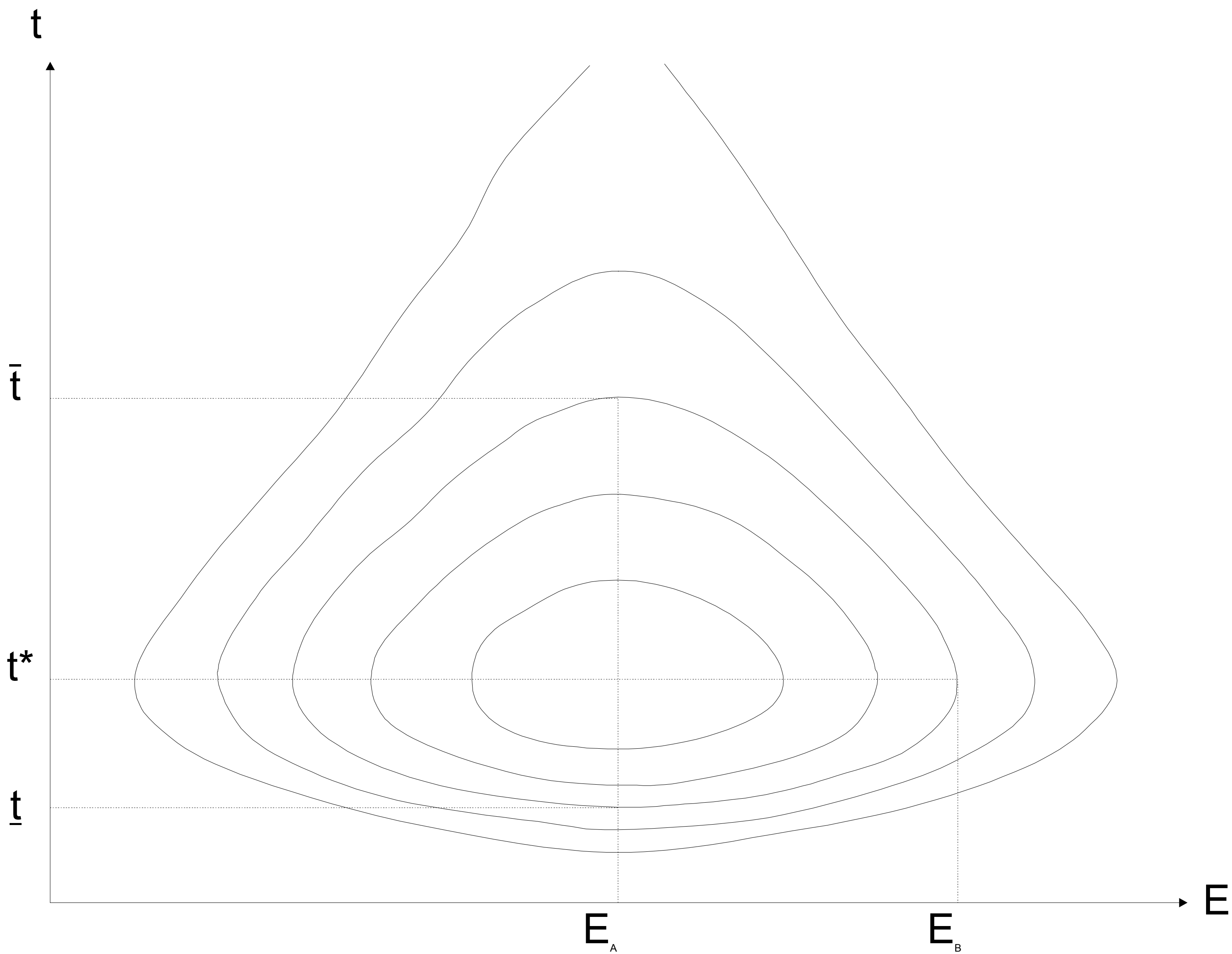

Figure 4: Preferences over tax rates and ethnic policies

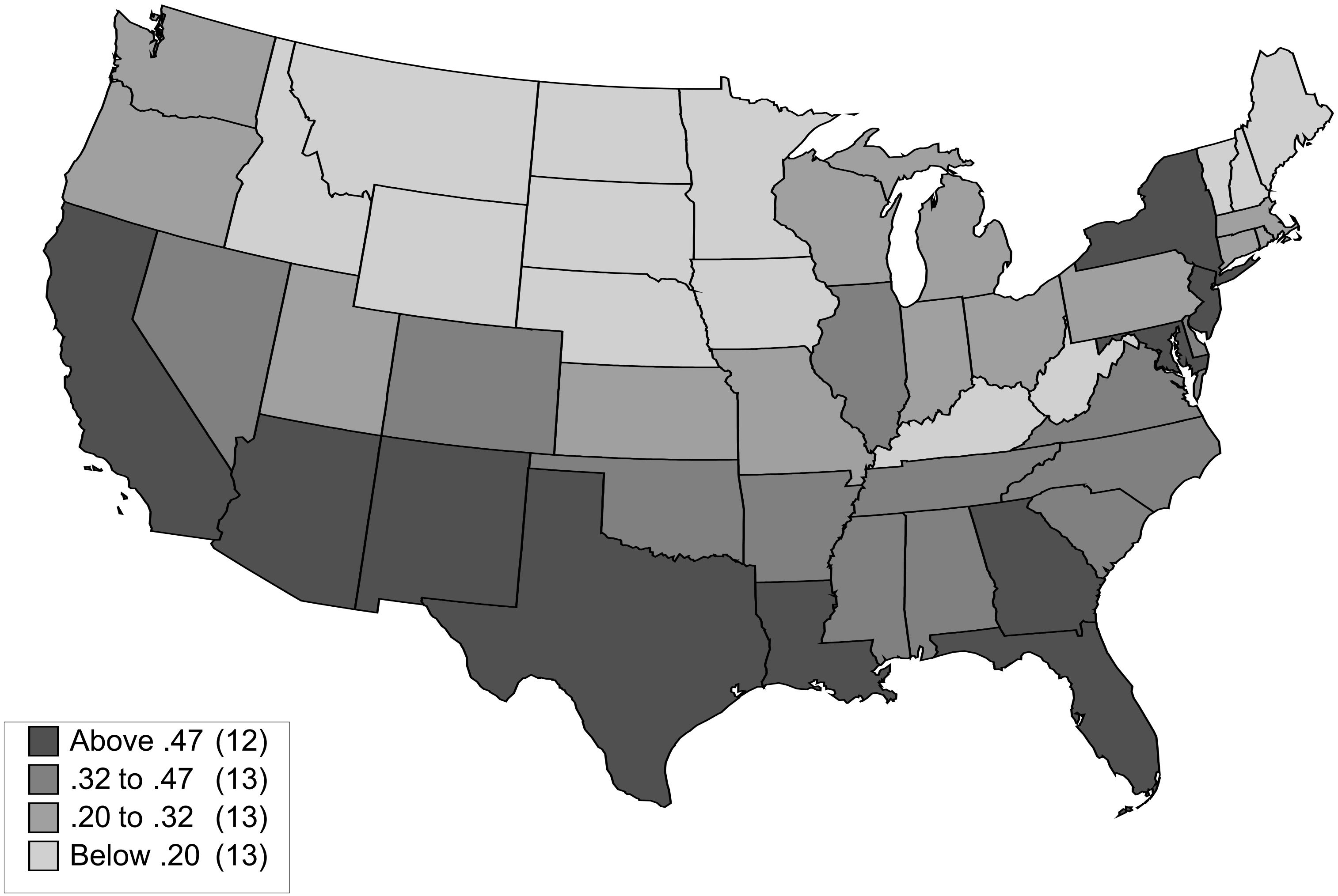

Figure 5: Fractionalization in 2000, by state

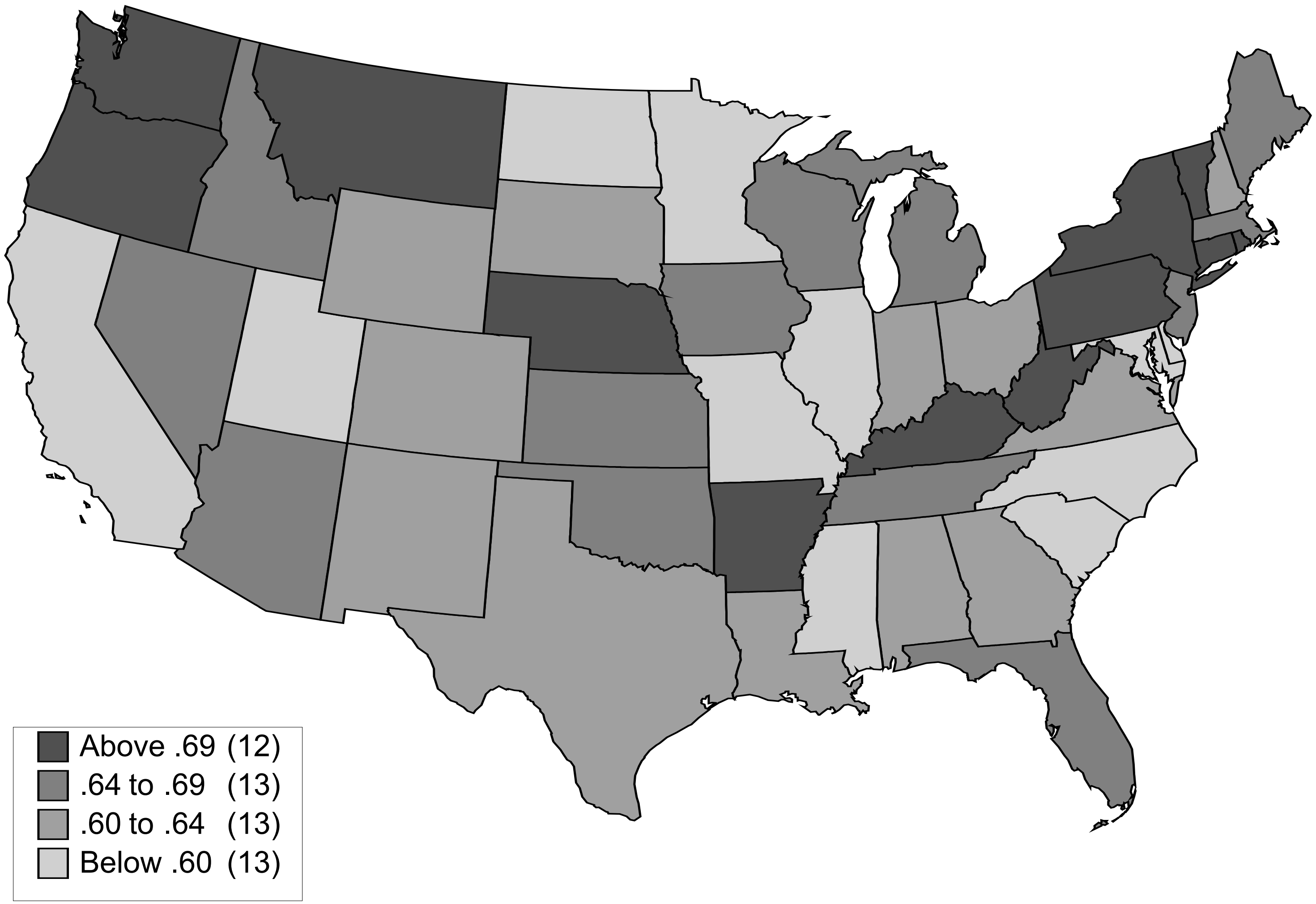

Figure 6: Within group inequality 2000, by state. Generalized entropy measure with parameter 0.

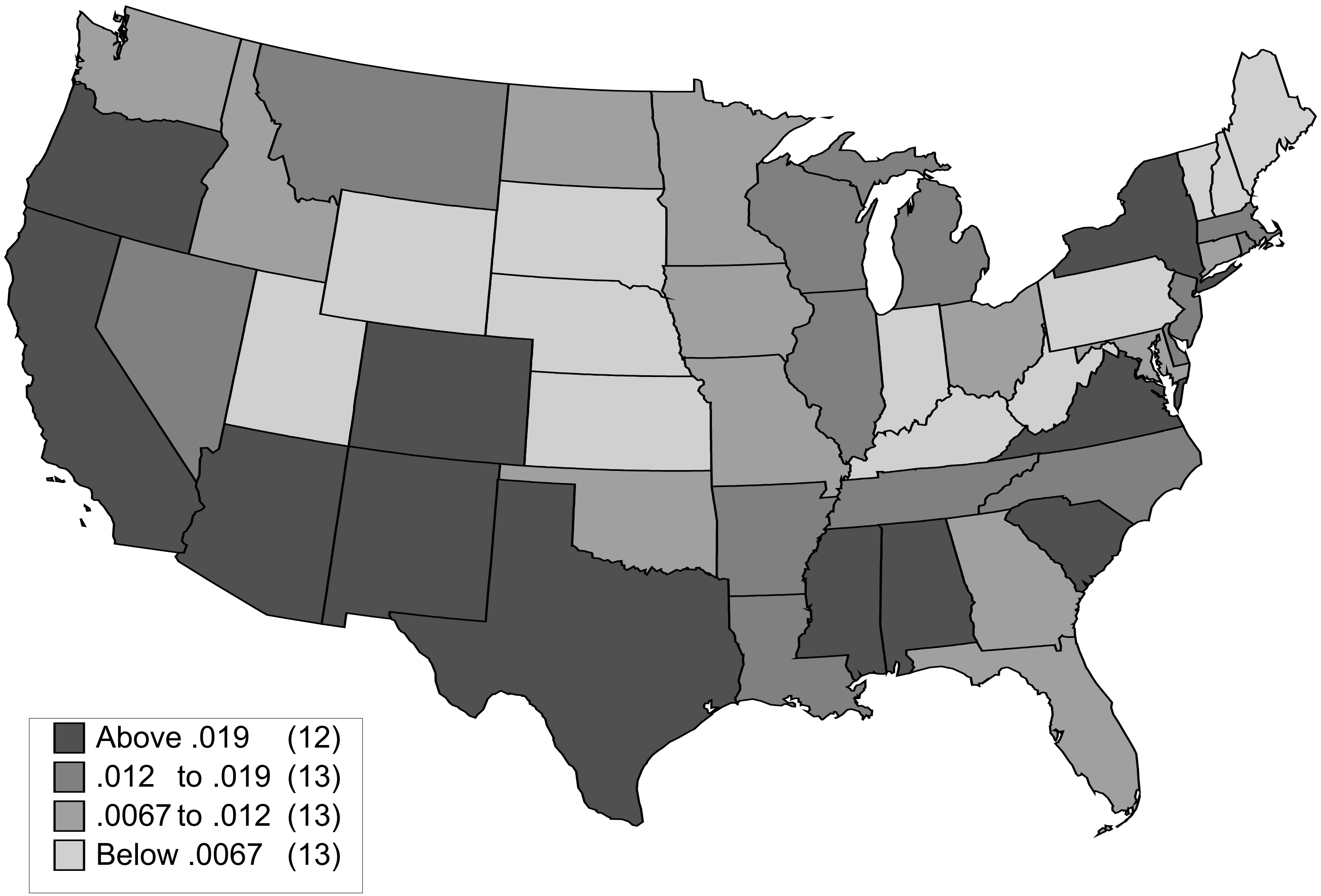

Figure 7: Between group inequality 2000, by state. Generalized entropy measure with parameter 0.

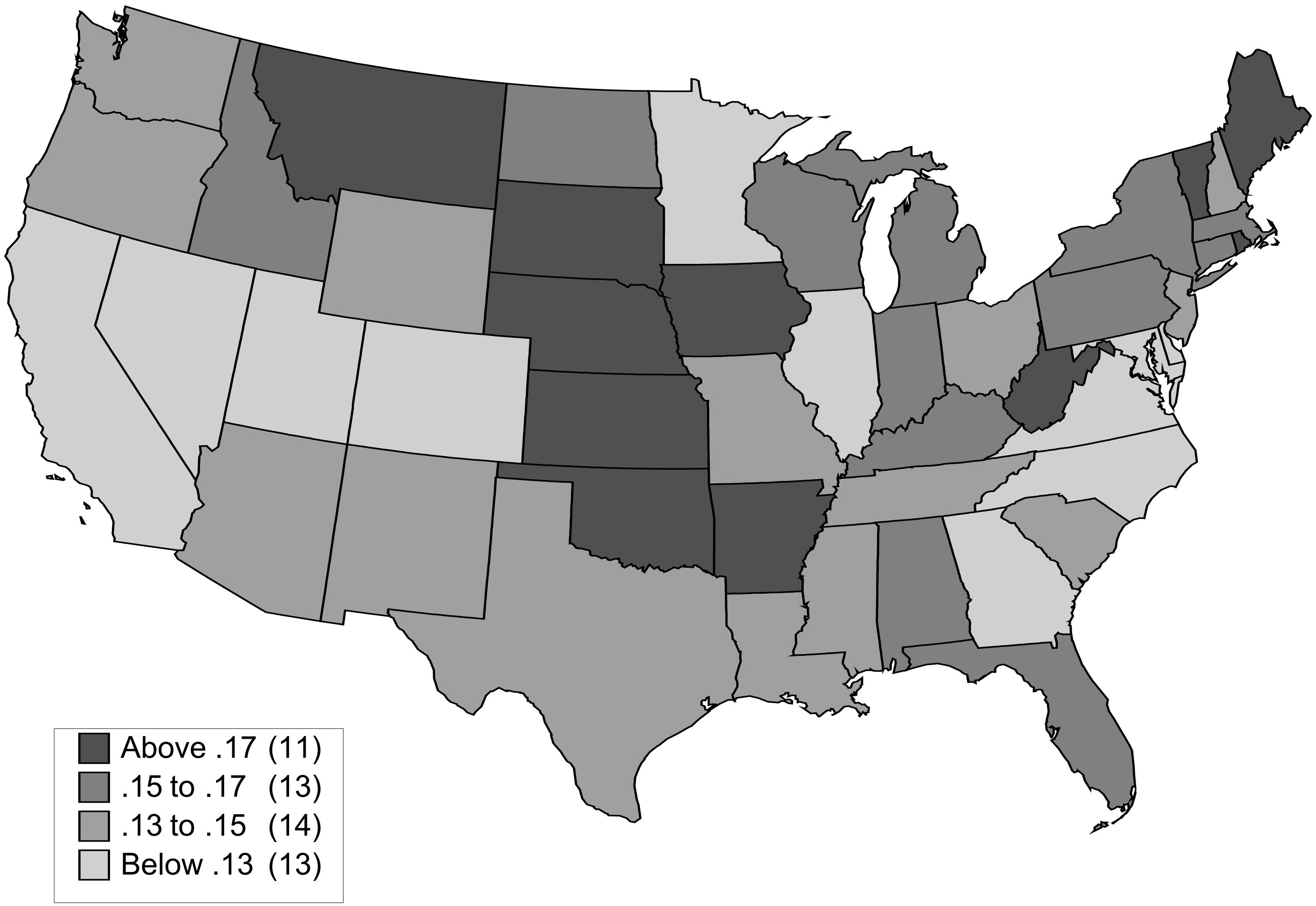

Figure 8: Average transfers received as share of household disposable income 2000, by state