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The Political Economy of Redistribution Through Higher Education Subsidies

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Abstract

Hansen and Weisbrod (1969) find that subsidies for higher education redistribute income from the poor to the rich. I examine the historical debate on redistribution through higher education subsidies and provide more recent evidence that the system does result in a negative redistribution of income. I then review the literature on political economy of selective welfare programs, with a particular emphasis on programs like higher education, which benefit middle income and upper income groups at the expense of the poor. The paper explains and extends the Fernandez and Rogerson 1995 model which demonstrates how a program of negative income redistribution (poor providing subsidies for the rich) could be approved by a majority of voters in a society. The paper then provides an empirical test of this model analyzing panel data from 1984 to 1999 from the American states. The two stage least squares results indicate a negative relationship between inequality and appropriations to higher education, as inequality goes up, states will provide less money for higher education. This provides initial support for the Fernandez and Rogerson model.

The Political Economy of Redistribution Through
Higher Education Subsidies

State governments provide the majority of support for higher education in the United States. Across all states in the year 2000, eleven percent of total expenditures were spent on higher education—a figure totaling 56 billion dollars. Without this level of subsidy from states, higher education as it is known in the United States simply would not exist.

Unlike other large state subsidized programs such as elementary and secondary education, higher edcucation is not a service available to all. Instead, in different ways in different states, the provision of higher education is rationed. For example, higher education is rationed at selective institutions according to the characteristics of students. In every state, selective public institutions deny some state citizens access to their services on the basis of the citizens' academic qualifications. It is hard to imagine other services being rationed in this way—for instance, limiting transportation services to only the best drivers would never be an acceptable method of rationing this state-provided good.

In perhaps a less familiar way, higher education is also rationed on the basis of price. Since even public higher education is not offered free of charge in every state, decisions about how much to charge for higher education are also necessarily decisions about who will be able to take advantage of this state service.

As a result of this rationing, both on the basis of academic qualifications and by price, public higher education is consumed primarily by higher income individuals. Access to higher education in the United States is inversely proportional to income. Even after controlling for academic ability, low income children are less likely than their peers to attend higher education (Ellwood & Kane, 2000; Kane, 1999).

In effect, states subsidize higher education by using taxpayer money that they collect from all citizens through some combination of taxes. States then spend a large portion of that money on a service that benefits only a subset of citizens—a subset that is primarily made up of middle and upper income people.

This combination of circumstances led Hansen & Weisbrod (1969a) to assert that higher education redistributes wealth away from the poor and to the rich. They based this result on a study of the current costs and distribution of benefits of California higher education. Given that all people pay taxes, and mostly middle and upper-income persons receive a higher education, they reason that this is a benefit that is paid for by all income groups equally, but enjoyed mostly by the non-poor. They conclude that, unlike state programs for health care or welfare, higher education as a state service does not distribute funds in a progressive manner.

Hansen and Weisbrod's assertions created a heated debate among scholars of higher education. . The argument at the time was about the degree to which state subsidies for higher education may or may not redistribute wealth from the poor to the rich or vice versa. Conventional thought at the time assumed that voters and their elected representatives would prefer to support a program that would distribute funds in a progressive way, but had been hampered by poor policy design.

This may not be the case. Instead, what if voters and their elected policymakers recognized that the benefits from higher education as a state service accrue primarily to middle and upper income persons? If so, the regressive redistribution of benefits would result not from flawed policy design, but from a deliberate attempt on the part of state policymakers to create a program that provides a benefit mostly for middle- and upper-income voters.

This chapter will examine the theoretical and empirical support for the idea that the redistributional effects of higher education subsidies are the direct result of a rational effort on the part of policymakers to design policies that satisfy their constituents' desires. This marks a shift away from the classic policy intervention literature, which assumes utilitarian motives on the part of policymakers, to the political economy literature, which uses formal theories of individuals interacting in strategic situations to explain how policymakers attempt to satisfy their own interests (Boix, 2003; Persson & Tabellini, 2002).

I begin this examination by revisiting the classic debate on the redistributional effects of higher education subsidies. I examine the claims and counter-claims of those involved in the debate, including those who argued at the time that the debate was not so much about measures of redistribution of income, costs and benefits,, but really about the underlying concepts of redistribution, progressivity, and costs and benefits (Cohn et al., 1970; Hartman, 1970). I conclude this section by updating the Hansen and Weisbrod analysis using more recent data sources—an analysis which shows that higher education as a service still provides high levels of benefits to middle and upper income citizens in the states. This analysis motivates the theoretical argument in the next section, which demonstrates that such a result may not necessarily be the outcome of poorly designed policy, but rather a feature of policymakers' desired outcomes.

The debate regarding redistribution through higher education subsidies was also a political debate. By arguing for or against an expansion of subsidies, analysts were favoring a particular view of the correct form of government intervention into higher education. However, few at the time expressly characterized the debate as being about politics as opposed to a politically-neutral policy debate. This chapter reframes the question as a political one, namely, under

what circumstances might a majority of voters favor a regressive system of higher education subsidies. The answer to this question can be found in recent developments in political economy.

I turn to the political economy literature on redistribution to examine the circumstances under which majorities of voters will prefer different types of taxation and redistribution of income across income groups. The political economy literature has been developed primarily in the last 25 years, after the initial debate on the redistribution of income through higher education had waned. Specifically this study makes use of theoretical developments in the area of selective welfare programs—state-subsidized programs which provide benefits to only a few, while relying on tax revenues collected from all.

The literature on selective welfare programs has spawned a series of theoretical treatments of higher education as a type of selective welfare program. I examine the formal theoretical models that have been developed to analyze the conditions under which a majority of voters might support the kinds of subsidy programs that are in place for higher education in many countries, including the United States.

In exploring this literature, I demonstrate how these theories can explain a pattern of subsidies that can appear to be irrational from a purely societal-utilitarian or Benthamite view in terms of the rational activities of fully informed voters and policymakers. The use of political economy as a tool to understand the antecedents of higher education policy provides clear explanations in terms of motivations and outcomes for all of the actors in a political system, a strength of this theoretical approach which I highlight in the conclusion.

In the next section, I take a single formal model of higher education subsidies developed by Fernandez & Rogerson (1995) and apply its equilibrium results to the

conditions existing in the American states. I provide a modest extension to the model by analyzing the conditions under which externalities would be sufficient to provide benefits equal to higher education for any group. I then restate the equilibrium results from the Fernandez and Rogerson model as hypotheses to be tested in an empirical setting. Using panel data from the fifty American states from 1984-1999, I examine whether the results predicted by Fernandez and Rogerson are in fact supported by the available data. I conclude by suggesting further empirical and theoretical developments that would shed further light on this subject. Of particular important theoretically is the idea of student ability and cross-subsidies between students and institutions. Emprically, the development of better quasi-experimental results will aid in sorting out the complex causal relationships that occur when analyzing state politics and policy.

Improving our understanding of this area is critical, as it is part of an expansion of the scope of research into higher education policy that takes into account not just the effects of a given policy, but also the antecedents of policy development. In the vast majority of research into this area in the past, the question has been about the effects of policies—for instance, the effect of higher education subsidies on the redistribution of income. While we still have much to understand, we know more than we ever have about this area. But we know very little about the conditions which give rise to the policies whose effects we are observing.

This has been changing in the last decade, as researchers have begun using theoretical frameworks adapted from sociology or political science to analyze the antecedents of state higher education policy(Doyle, 2004, In Press; Hearn et al., 1996; Hearn & Griswold, 1994; Lowry, 2001a,b; McLendon, 2003; McLendon et al., In press, 2006, 2005). This chapter provides an alternative theoretical basis for

understanding the origins of state policy for higher education, one based on political economy.

As a field, political economy shares a common interest with political science insofar as it seeks to understand "how policy decisions are made, what shapes the incentives and constraints of the policymakers taking those decisions, and how conflicts over policy are resolved"(Persson & Tabellini, 2002, p.2). In addition, political economy makes use of the traditional tools and assumptions of microeconomic analysis, modeling strategic interactions between individuals who are acting on a set of preferences, usually subject to simplification in the form of a utility function. The choices of individuals, given the choices of other individuals in a given strategic situation, result in an equilibrium or equilibria, which can then be described mathematically.

As this chapter will show, political economy provides a substantive addition to our understanding of higher education policy. In the single area under consideration, the use of the theoretical tools of political economy can illuminate a longstanding debate about one of the most important interactions between state politics and higher education: the provision of resources to support the institutions and students.

Redistribution Through Higher Education Subsidies:
The Historical Debate

Government support of higher education has traditionally been though of as a progressive redistribution of income, providing benefits for individuals which they would not have been able to afford otherwise (Schultz, 1968). But what if this were not the case? Could it be that higher education instead redistributes income away from the less wealthy and to the rich?

The debate on redistribution through higher education subsidies could have

begun in September 1967, when the California Legislatures' Joint Committee on Higher Education asked two economists, W. Lee Hansen and Burton Weisbrod, to conduct a study that would compare the benefits and costs of higher education in the state McGuire (1976). The researcher's conclusion, stated in a monograph based on the research contained in their state report, shocked policymakers and researchers:

> The effect of these subsidies is to promote greater rather than less
> inequality among people of various societal and economic backgrounds
> by making available substantial subsidies that lower income families are
> either not eligible for or cannot make use of because of other conditions
> and constraints associated with their income position ... it is clear that
> whatever the degree to which our current higher education programs
> are rooted in the search for equality of opportunity, the results still
> leave much to be desired (Hansen & Weisbrod, 1969a, p. 78)

The authors' conclusions were quite controversial, and were debated in academic and policy settings for almost a decade(Carnegie Commission, 1973; Cohn et al., 1970; Hansen & Weisbrod, 1969a,b; Hartman, 1970, 1976; McGuire, 1976; Pechman, 1970; Windham, 1976; Zwerling, 1973). If it was true that the extensive and complex program of higher education subsidies in the country did more to benefit high income than low income students, there was no argument to be made for the support of higher education subsidies as a progressive redistribution program. Instead, public support of higher education could be categorized as a distributive program, providing support for a group of favored constituents.

This section will review this debate, concentrating on the substantive issues raised by Hansen and Weisbrod, their particular methodology used to estimate the

concepts in their work, and the debate about both. As will be seen, there are no clear answers to many of the questions raised, although more recent data leaves reason to suspect that the Hansen and Weisbrod formulation was essentially correct.

The Benefits of Higher Education

Hansen and Weisbrod begin by tallying the benefits conferred upon individuals as a result of receiving additional education beyond high school. Their chief contention is that the benefits are primarily, if not entirely, private. In making this argument they are echoed by many other economists, probably the most prominent being Milton Friedman 1968. Those who argue that the benefits are not primarily private have two main points. First, attendance at in institution of higher education translates into higher levels of personal income and productivity, which benefits society when that income is taxed and those revenues are translated into public benefits. Second, there are unmeasured but possibly important externalities when higher education is provided to individuals. This argument contends that the whole society benefits when an individual becomes more educated, as that individual becomes more likely to become involved in a range of activities which benefit everyone living in the society.

The first benefit to be conferred on any person who attends higher education is higher lifetime earnings (M. Paulsen, 1998; Pencavel, 1991). Data in support of this assertion have accumulated for decades, and current data as shown in Figure 1 continue to support this claim: attendance at an institution of higher education confers higher lifetime earnings on individuals. This effect is not limited to those who have attained some form of credential, but extends to those who have attained only course credits (Kane & Rouse, 1995). Hansen and Weisbrod tally the net present value of increased income as the first and primary benefit for any

individual who attends higher education.

Insert Figure 1 about here

This level of increased income may result from two characteristics of individuals. It could be that increased lifetime earnings for college graduates arise as a result of the increase in skills and abilities for these individuals, and the concomitant increase in productivity realized in the workplace (Bartel & Lichtenberg, 1987; James et al., 1989; R. R. Nelson & Phelps, 1966; Wise, 1975).

Secondly, increased lifetime earnings could also be the result of innate skills and abilities, which resulted into selection into higher education (Weisbrod & Karpoff, 1968).. In this case, attendance at an institution of higher education could simply be a signal of skills and abilities which remain unchanged throughout a student's career in college. As Hansen and Weisbrod state, "there is strong reason to believe that those persons who go on to college and especially those who graduate, are in general more able and ambitious than those who do not enter college"(Hansen & Weisbrod, 1969a, p. 18)

Estimates cited at the time of the Hansen and Weisbrod study put the percent of the income differential between college graduates and non-college graduates due to innate ability at somewhere between 12 and 40 percent. More recent evidence has suggested that the income differential due to student's innate aptitude could be as high as 50 percent (Hoxby & Terry-Long, 1999).

Few analysts subsequently debate Hansen and Weisbrod's assertion of higher lifetime earnings as a result of increased education. Rather, most of the debate has centered around the proportion of the wage premium associated with increased education and the distributional assumptions made in the Hansen and Weisbrod

study (Pechman, 1970). None of the evidence mustered since the time of the original debate essentially disputes the assertion that individuals do benefit as a result of higher education in the form of higher incomes, even after accounting for higher levels of innate ability (Ashenfelter & Rouse, 19998). Individuals do achieve a higher level of income than they would have otherwise as a result of attending a college or university. This means that policy decisions about who goes to college are also decisions about who will, on average, have higher lifetime earnings.

Attendance at an institution of higher education also confers consumption benefits on individuals. This consumption benefit could be positive—students presumably enjoy the experience of higher education, finding it innately pleasurable to attend classes and spend time on college campuses. It is also possible that the consumption benefit is negative. Students may not like college much and may find that the entire experience is unpleasant, but presumably necessary in order to reap the income benefit described above.

Scant evidence has accumulated in support of either explanation of the consumption benefits of higher education. Some authors assume that the benefit is equal to the expenditure per student within any campus, which may or may not be the case—funds within any campus are far too fungible to assume that all funds expended go toward an individual's education. (Winston, 1997, 1999, 2000). It is most likely that there is substantial heterogeneity among individuals in the consumption of benefit of higher education, which is on average positive, but still may be negative for a non-negligible proportion of the population–this would be in line with evidence on the heterogeneous effects of schooling in general (Ashenfletr et al., 2000).

In addition to the two wholly private benefits described above, authors have described a lengthy list of possible *public* benefits of higher education.

The important distinction to be made when discussion turns to the public benefits of higher education concerns the effect of higher education on individuals' incomes and the effect of higher education on other attributes of individuals.

Public benefits accrue when individuals with college educations demonstrate higher productivity, earn higher wages and pay higher taxes. There can also be second-order effects of this higher productivity, as more capable individuals engage in activities like starting or growing firms which then result in more individuals gaining higher wages and paying higher taxes. The public benefits from these types of activities to the extent that the government charges higher taxes and spends tax revenues on public goods (Hanushek et al., 2001, 2004).

The second type of public benefits of higher education concern classic externalities. These include all of the benefits that accrue to individuals who are not party to the original exchange (H. R. Bowen, 1980). The first list of externalities includes all of the types of activities and characteristics of individuals that occur as a result of their attendance in higher education. For example, individuals who attend higher education are thought to be more civic minded, to appreciate and therefore support artistic activities more than others, to have better health, and to provide for the continuation of knowledge(Astin, 1993; W. G. Bowen, 1977). All of these outcomes of higher education for individuals have benefits that extend beyond just their own personal benefit and into society at large.

Hansen and Weisbrod are quite skeptical on this point:

Our apparent skepticism about either the existence or significance of some of the widely discussed external benefits of from higher education stems principally from the absence of any substantial body of evidence in support of them. Indeed, much of the so-called evidence is anecdotal

in nature. We do not, however, wish to assert that external benefits do not exist; only that they are elusive and demanding of a great deal of hard attention. (Hansen & Weisbrod, 1969a)

Others at the time were much less skeptical of these types of benefits, and roundly criticized Hansen and Weisbrod for their apparent willingness to forsake a critical goal of higher education simply because of difficulties in measurement:

The difficulty in the decision to support a public higher education system is that it is probably impossible to measure the value of the public benefits to be derived from it. Hansen and Weisbrod pay lip service to the idea that there may be public benefits . . . and then proceed to allocate all public higher education costs to individual families. In practice, foregone earnings plus living costs and fees paid by college students account for perhaps 70 percent of the total costs of higher education in the United States. No one knows whether this approximates the ratio of private benefits to total benefits, but it its very doubtful to assume that the ratio is as high as 100 percent, as Hansen and Weisbrod and other economists assume. Under such circumstances, it would seem to be the better part of wisdom to proceed cautiously . . . (Pechman, 1970, p.369)

There are two equally plausible readings of the available data on public benefits of higher education. First, similar to Hansen and Weisbrod and others, including e.g. Friedman (1968), one can conclude that evidence on externalities remains scarce because the externalities themselves are scarce. On the other hand, one can conclude from the massive societal investment in higher education in the United States that externalities must be positive and real, as it would not be

possible for so many people to engage in an act of mass delusion for such a long time period (H. R. Bowen, 1980; W. G. Bowen, 1977). The lack of evidence regarding possible externalities of higher education makes it impossible for either side in this debate to make an authoritative argument.

Forty years on, the debate regarding the external benefits of higher education remains unsettled. Changes in funding levels for public institutions and a smaller share of institutional budgets coming from governments have led many to conclude that the societal judgment about the benefits of higher education have shifted from an emphasis on public to an emphasis on private benefits(Coutourier, 2005). Yet we have not gotten any closer to understanding the actual magnitude and any effects of the public benefits of higher education.

The nature of the benefits of higher education are key to understanding the distribution of these benefits among individuals. If higher education is a primarily private good, then governmental decisions about the provision of higher education are decisions about how to redistribute a scarce good among a group of individuals. However, if higher education has extensive externalities, then the benefits are not exclusive to those who attend higher education. The lack of evidence on externalities means that the only measurable benefits of higher education are private.

The second kind of public good that may come about as a result of individuals' attending higher education has to do with their private returns. Although infrequently stated clearly, one kind of public good that can occur as a result of increased income is increased equity of income. Highly inequitable distributions of income have been associated in the empirical political economy literature with societal instability, including the possibility of revolt (Boix, 2003). As more people attain higher education and receive the productivity and income

benefits that accrue to individuals, some hypothesize that societal inequality will decrease and societal stability will decrease. Higher education may therefore confer benefits on society to the extent that it provides for increased income across a broad range of individuals (Hanushek et al., 2001, 2004; Lewis & Dundar, 2001). The opposite of this result would also hold. If higher education increases stratification by increasing incomes among those who already would be among the highest earners in society, it could increase inequality and result in a negative externality (Ferreira, 2001).

Many arguments for increased subsidization of higher education place a heavy emphasis on the idea of reducing societal inequality by conferring the income premium of a college education on a broad section of society (Levin, 1978; McPherson, 1983; Schultz, 1968; Windham, 1976). One must assume that those who make this argument further see an indivisible benefit to society of having a more equitable distribution of income, a possibility that I will explore further when discussing the political economy of these subsidies.

The current evidence on this debate does not strongly support the idea that higher education subsidies support a more equitable distribution of income. Figure 2 displays the income distribution for young people who fall into one of three categories: attending a four year institution, attending a two year institution, and not enrolled in higher education. The income profile for those who attend higher education remains much higher than the income of those who do not attend.

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Insert Figure 2 about here

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As Hansen & Weisbrod (1969a) tally up the benefits of higher education, they assume that the income benefit that can be attributed to higher education

alone should be the only benefit counted when comparing costs to benefits. As this section shows, the other alternatives that they entertain and dismiss have strong support from many other quarters. Many suggest that experience of higher education itself constitutes a benefit in the form of consumption—a contention that has no more support now than it did when Hansen and Weisbrod began the debate. Others suggest that public benefits constitute a significant proportion of the total benefit of higher education, an assertion that still awaits further investigation and evidence (W. G. Bowen, 1977; Carnegie Commission, 1973). Finally, another form of public benefit may accrue through a more equitable society that comes about as the higher overall income that results from more education is equitably distributed throughout the population. We will consider this debate again when we turn to a comparison of costs and benefits.

The Costs of Higher Education

Higher education provides substantial benefits to individuals, and may contribute some benefits to society as well. These benefits come at a cost, although the nature and extent of the costs of higher education are also subject to debate. Hansen and Weisbrod's approach to the costs of higher education takes into account the amount that different types of individuals contribute to the overall system of higher education either directly, through their foregone income and tuition, or indirectly, through their tax payments (Hansen & Weisbrod, 1969a). As Hansen and Weisbrod calculate it, the cost of higher education for any individual is comprised of instructional costs, capital costs, associated costs (i.e. books, room and board), and foregone income. This formulation includes the direct outlay from the state and other sources such as tuition for instructional costs, the amortized capital cost over time of use of facilities, the indirect costs of higher education that nevertheless must be paid, and the lost income that accrues to individuals and

their families as a result of their decision not to work but to instead attend higher education.

In his pointed critique of their work, McGuire (1976) suggests that Hansen and Weisbrod should include student financial aid in the costs of higher education, a decision that would substantially lower the estimated net costs of higher education for this group. Hansen and Weisbrod themselves note that at the time of their study, , "students' costs are not closely related to family income"(Hansen & Weisbrod, 1969a), and that later changes in policy, particularly the implementation of the Basic Educational Opportunity Grant, led to more income-sensitive pricing policies (Hansen & Weisbrod, 1978).

McGuire states that when the subsidies for higher education are appropriately adjusted, "the total subsidy given to students from below-average-income families is larger than that extended to students from families above this average, *even in the aggregate*"(McGuire, 1976, p. 353, italics in original). McGuire's analysis depends critically both on the assumption that only appropriately aged families should be included in the analysis, and that low-income students take full advantage of the tuitions subsidies available through grant aid, points that Hansen and Weisbrod make in their response to the article (Hansen & Weisbrod, 1978).

Comparing Costs and Benefits of Higher Education

It is in the comparison of costs with benefits that one finds the most controversy surrounding the Hansen and Weisbrod study. First, the authors calculate the cost to the individual of higher education as the sum of direct expenses plus foregone income. The benefits to the individual are calculated as the increased lifetime earnings of the individual plus any consumption benefit that the individual may gain through higher education.

From the perspective of the state, investment in higher education is not simply a payoff to an interest group if the payments to the group in question are recouped by the state. Hansen and Weisbrod suggest two methods for answering this question. First, they calculate the expected increase in taxes due to the state as a result of a student attaining a higher education, minus the subsidy provided to that student in the form of a college education. Second, they calculate the subsidies to families made through higher education expenditures compared with family payment of taxes.

The authors' results for the first analysis suggest that "in no case do state and local taxpayers recoup the full value of the subsidy"(Hansen & Weisbrod, 1969a, p.59). As the authors note, there may be externalities that the rest of the state benefits from, but these would need to have a percent of value of "between three and five times the present value of taxes paid for each public college graduate"(Hansen & Weisbrod, 1969a, p.59).

The second method for comparing the costs and benefits of higher education contrasts how much families pay for higher education and the level of benefit they receive. Hansen and Weisbrod choose to make this calculation for all families, a decision which others later find to be questionable(McGuire, 1976)[1]. The calculation of current patterns of subsidy that occur through the higher education program involve understanding who goes to college and the subsidy they receive, compared with the amount paid by the entire population. As Hansen and Weisbrod show, many do not benefit from higher education subsidies because they do not have children in college. They estimate that the average estimated subsidy for those families with children in college ranges from $720 to $1700 dollars, compared with no subsidy for anyone without children in college.

These assertions are controversial in that they fundamentally challenge the

premises for subsidizing higher education. First, the authors find that the costs of subsidizing higher education far outstrip the benefits that having a more highly educated population provide to the state, at least in the form of tax revenues. Second, they suggest that those who do not attend higher education are paying for those who do, with no tangible benefit to themselves or their families. If Hansen & Weisbrod (1969b) are correct, then such a system is hard to justify on purely utilitarian grounds.

The Distribution of Costs and Benefits of Higher Education

After sorting through the questions of which benefits and costs are to be measured, Hansen and Weisbrod look next to the distribution of these costs and benefits across the population of California by family income. If the system of higher education subsidy in California is progressive, they should find that low income individuals receive more benefits from the system than it costs for them. Conversely, a regressive system will cost more than it benefits them, with these benefits redistributed to the middle class or wealthy. Their most famous and controversial finding from this analysis was that the system was regressive—in their words: "the net benefits of one of California's major expenditure programs are received largely by higher income segments of the populations"(Hansen & Weisbrod, 1969a, p.77).

Hansen and Weisbrod assume that the costs of higher education are shared by students and the general public. That is, even considering student costs, a substantial subsidy is provided by the public to every student who attends public higher education in the state. This subsidy is lowest at community colleges and highest at the University of California.

The receipt of this subsidy is therefore highest among those families whose children attend higher education, and within that group, highest among those who

attend elite institutions. The authors then show that students from high income families are most likely to go to college, and when they go to college, most likely to attend elite institutions. The reverse is true for low income families: their children are least likely to go to college and, among the small group who do go, are least likely to attend an elite institution.

Based on these results, the authors conclude:

For families with a child at one of the State Colleges or one of the University Campuses, the net transfers rage from $630 to $790 per year. Meanwhile, families without children or with children not enrolled in public institutions of higher education receive no subsidy whatsoever, while the pay an average of $650 in state and local taxes . . . the current method of financing public higher education leads to a sizeable redistribution of income from lower to higher income. (Hansen & Weisbrod, 1969a)

Hansen and Weisbrod describe a system where everyone must pay taxes, and those taxes are not particularly progressive. These taxes pay for a subsidy that is targeted on mostly middle- and upper-income children. The result is that the poorer families, whose children do not go to high-subsidy institutions if they attend at all, finance the higher education of middle-income and wealthy students.

Not everyone agrees that this is the case, even when considering the same data that Hansen and Weisbrod utilize. Pechman (1970), for example, notes one critical flaw in the Hansen-Weisbrod analysis: the authors suggest that all of an individual's tax payments go to higher education, while in fact the state spends tax money on a variety of purposes. Pechman states that when one compares the portion of tax money spent on higher education by families from each quintile with the benefit accrued by that family, the result is a positive benefit for all groups.

Pechman also criticizes Hansen and Weisbrod for not considering the costs and benefits of higher education over the lifetime of the individuals concerned, as opposed to the single-year analysis conducted by the authors. Pechman states:

> The present generation of voters must decide whether an investment in higher education is desirable from a social point of view. This involves a balancing of expected *public* benefits against costs, both appropriately discounted. If the decision to invest in higher education is affirmative, the voters must then decide how the costs should be allocated among its members.

As I will discuss later in the chapter, recent developments in the field of political economy have taken up exactly the questions Pechman raised in 1970. However, Pechman's central point was that higher education concerns an intergenerational transfer, with benefits accruing across an entire society over the lifetime of the younger generation, benefits which the older generation never expects to enjoy.

The key difference between the authors concerns their understanding of the "net" costs and benefits of higher education. When an individual's taxes are included as a part of the price of higher education, and societal subsidies are calculated for students in each income class, the result is clear: high income students receive higher subsidies than low income students. When the exact amount of taxes spent on higher education are compared with exact amount of subsidies spent on young people from each income class, the result is equally clear–the net benefit to the poor is positive, while the net benefit to the wealthy is negative. In short, as Hartman (1970) points out, the authors do not disagree on the data, but rather on the very definition of redistribution [2].

James (1980) follows Pechman in suggesting that it is the future earnings of

students in higher education, and not the past earnings of their parents, that are the key to any study of the distribution of benefits of higher education. James provides a model in which individuals benefit from higher education according to their skills and abilities, but repay the subsidy they receive over their lifetimes in the form of higher taxes. She is one of the few to recognize that consumption is not positive for all involved, and that many do not benefit as much as would be expected from the higher education they receive. In fact, in a formal model, she demonstrates that "contrary to popular belief, several major consumer groups in higher education do not receive a positive cost subsidy"(James, 1980, p.135).

Hansen and Weisbrod believe that any properly redistributive program must spend more in absolute terms on low income persons than on high income persons. In contrast, Pechman believes that a redistributive program need only provide higher average benefits to a group than the amount that they paid for that specific program in taxes.

It is certainly worth noting that Hansen and Weisbrod themselves were quite cautious in interpreting their results, saying:

> . . . The distribution of students by parental income . . . are so wide for
> each type of system—University of California, State College, and
> Junior College—that any strong conclusions about the "class-serving
> nature" of the entire system of higher education in California cannot be
> drawn. While there is a tendency for higher subside schools to draw a
> higher income clientele, the overlap of distributions is very
> substantial.(Hansen & Weisbrod, 1969a)

Nearly 40 years later, we are not much closer to finding the answers to these questions than were the initial studies. Because of the fungibility of higher education funding (Breneman, 2001), the exact amount that is spent on any one

student as they track through the system of higher education is nearly impossible to calculate precisely. Understanding distribution of tax benefits is somewhat easier, but the connections between the two are no easier to ascertain than they were for Hansen and Weisbrod.

Taking an intergenerational perspective on this issue would entail understanding how families pay for higher education and repay the subsidies provided to them through their children or subsequent generations. From this perspective, the data we would need to have in order to fully comprehend the redistributive nature of higher education would include the amount of state taxes paid by an individual's parents, along with the proportion of that tax amount that was directed to higher education. We would then need to know the exact amount spent by the state over the course of the individual's lifetime to subsidize that person's higher education.

From a lifetime perspective, one would need the same subsidy information, but instead of parent's tax payments, we would need the individual's tax payments. This would help to answer the question of whether the state is receiving adequate compensation in the form of future tax revenues when it subsidizes the individual to go to higher education.

Other benefits information could include the benefit to the state of having a more productive individual, along with the benefit to society of individuals who may have a fuller engagement with civic life. We can not measure or know in a specific way any of these things.

Although we may not be able to identify the cost of higher education and the benefit of higher education for every individual in our society, we can understand in a broad sense:

1. The amount that their families are paying into the system of higher education

2. How individuals from different income groups are currently benefiting from the system of higher education

Such an analysis could broadly replicate the data that Hansen and Weisbrod, along with Pechman, McGuire, and others analyzed in the 1970s. Understanding whether the broad trends have changed will give a sense of how the debate may have shifted since that time period.

The Costs and Benefits of Higher Education: Who Wins? Who Loses?

In this section, I attempt to identify the subsidy patterns currently in place in the United States by pursuing some of the assumptions that Hansen and Weisbrod found palatable. This will provide a basis for my subsequent discussion of the political economy of redistribution. The trends are expected to be broadly negatively redistributive as suggested by much of the theoretical literature. If the trends are progressive, then the fundamental assumptions of much of the extant literature needs to be questioned.

To replicate the Hansen and Weisbrod analysis using more current data, I use data from several sources to calculate the following, all for the year 1996: the total amount of state taxes that families in different income groups paid; the attendance patterns by students from different income families in different sectors of higher education; and state subsidies on a per student basis in each sector of higher education.

Table 1 displays the results of the analysis. Each column describes an income group, with four income groups represented[3].

_____

Insert Table 1 about here

_____

The next row displays the total amount of state taxes claimed by individuals in each income group on their tax returns. While this figure is imperfect in that it does not capture all of the state taxes paid, it does represent the best data available on a nationwide basis regarding state taxes paid by income group. It does not take into account the amount of sales taxes that are paid by each income group—all indications are that such a tax is regressive and would result in a higher figure for taxes paid by the lowest income groups(N. Johnson & Tenny, 2002; United States Department of Treasury, Internal Revenue Service, 2006).

The table is then sub-classified by sector of higher education: public two year, public four year, and private four year. For each sector, the percent of students from each income group reporting their institution of first attendance is recorded in the table. For instance, among low income ($0-10,000 family income) students, 47% reported attending a community college as their first institution of higher education [4].

Next, I report the average per student state subsidy by institutional type [5]. The figure for two year institutions shows that state appropriations for two year colleges averaged $3,324 per student during this time period.

The next row multiplies the percent of each income group attending a particular sector by the subsidy for that sector to arrive at an aggregate per person subsidy, including those who did not attend higher education. For instance, the figure $1,563 in Table 1 represents the average per-person subsidy for community colleges among those whose family income was $0-10,000. This analysis is repeated for each type of institution.

The results in Table 1 repeat the findings Hansen and Weisbrod in many ways. The group that receives the highest subsidy currently is the broad middle income group with incomes in the $20-50,000 dollar range. Those in the lowest income group receive substantially less than those in the middle class, while those in the highest income group receive less than all other groups.

Following the Hansen and Weisbrod approach detailed previously, it is quite clear that the system still does not operate in a redistributive manner. Subsidies generally increase with income, indicating that the system is not progressive. Using Pechman's approach, the amount that low-income individuals pay in to the system is exceeded many times over by the amount that they receive in subsidies. This is true for every income group but the highest income individuals [6]

This analysis has a number of limiting features. First, as noted, the analysis does not include sales taxes, which are highly regressive and would raise the total tax bill for low income individuals by a large amount (N. Johnson & Tenny, 2002). It should be noted, however, that for the net benefits to exceed the net payments, the amount would need to be in the range of $2,500, which seems quite high for this group. Second, the analysis does not include state revenues generated through lottery proceeds, which are another (highly regressive) form of taxation (Clotfelter & Cook, 1989; Clotfelter et al., 1991). Many states have turned to lotteries to fund higher education scholarships, a trend that may decrease the degree to which the system of higher education subsidies is progressive (Dynarski, 2000; Heller & Marin, 2002).

Last, like Hansen and Weisbrod, this analysis offers only a snapshot of the patterns of subsidies and returns to higher education. Evidence suggests that high income students are more likely to attend full time and graduate from higher education, while low income students are more likely to attend part time and not

to graduate from higher education. This analysis does not capture the extent to which high income students are taking fuller advantage of the system of higher education. The actual patterns of redistribution may be even more regressive than the ones described above.

Hartman, writing on the controversy generated by the Hansen and Weisbrod research, notes what he calls the "raw facts"(Hartman, 1970, p.521):

> 1. Poor people pay taxes and very few of them use higher education. Those who do, gain thereby; those who don't, don't.
> 2. Middle income people are heavy users of the system. Their taxes don't cover costs.
> 3. A few rich people use the system and gain handsomely thereby. (Hartman, 1970, p.521)

As it turns out, these raw facts remain true today. Higher education subsidies are distributed in such a way that low income individuals receive the lowest amount, while their middle income peers receive the most. High income people benefit to the extent that they are subsidized at all for a consumption choice that they would have pursued in the absence of any subsidies. The analysis presented in Table 1 most likely presents a "best case" scenario, in that regressive taxation forms like sales taxes and lotteries are not included in the analysis.. All indications are that the patterns of redistribution are even more regressive than this fairly simple attempt to capture them.

The situation in other contexts may be even more extreme. Rozada & Menendez (2002) find that the system of higher education in Argentina is sharply skewed toward subsidizing the rich: "Almost 50% of the students in public universities belong to the top 20% of the income distribution. Moreover, 90% of the students in public universities have higher than median per capita family income . . ."(Rozada & Menendez, 2002, p. 348). The authors conclude that in the Argentinian context the majority of the costs are borne by low income taxpayers,

while the majority of the benefits are enjoyed by the wealthiest part of the society.

Based on the analysis provided here, it appears that the balance of evidence suggests a regressive system, one in which low income students receive among the lowest benefits.The question then, is why would this be so? The policy recommendations of most of the authors writing on this topic in the 1970's and into the early 1980's were formulated based on the implied belief that if only legislators knew that the system were regressive, they would change policies to make it more progressive (Hansen, 1970, 1972; Hansen & Weisbrod, 1969a, 1978; Hartman, 1970; Hight & Pollock, 1973; McGuire, 1976; Pechman, 1970; Zwerling, 1973).

But what if policymakers knew that the system was regressive all along? Indeed, what if the point of public funding of higher education was to introduce a publicly financed middle and upper income benefit?

Cohn, writing in 1970, acknowledges this possibility:

First, an assumption implicit throughout the analysis is that resulting distributive effects are "undesirable." But this assumes that either the policymakers are unaware of redistributive effects of higher educational subsidies or that, even if aware of the results, they are constrained in some way, in correcting the deficiency . . . We may assume the legislature is perfectly aware of the situation. However, the legislators choose to to remedy it through income transfers (using taxes and/ or expenditures in other areas) or they choose not to remedy it at all. (Cohn et al., 1970)

Mumper (2003) suggests that state policymakers have knowingly engaged in goal substitution, moving from a system of subsidies designed to help low-income students and families to one that emphasizes benefits for middle income students. As Mumper states "the efficiency of targeted design and the sustainaiblity of

universal design were no match for the relentless pressure of subsidy creep"(Mumper, 2003, p. 57)

More recent developments in the field of political economy have led to a fuller understanding of the conditions under which legislators might choose to implement a regressive redistribution of income through a selective benefit such as higher education. The next section will examine this literature in order to better understand why the system that Hansen and Weisbrod describe might be the product of deliberate intentions of both voters and their elected leaders.

Political Economy and Redistribution Through Higher Education Subsidies

The previous section examined the debate Hansen and Weisbrod fomented through their contention that higher education subsidies serve as a benefit to the rich, instead of the poor. The studies they inspired all had a common purpose: to document the extent to which the system of higher education subsidies in the United States serves to benefit any particular income group (Cohn et al., 1970; Hansen & Weisbrod, 1969a, 1978; Hartman, 1970; McGuire, 1976; Pechman, 1970; Peltzman, 1973; Windham, 1976).

The goal of most of these studies seems clear. If the system is shown to work in a way that is not progressive, then legislators and other policymakers must be informed so that they can change the system. As Hansen & Weisbrod (1969a) conclude:

> there is presently no effective device for shifting more of the financial
> costs of higher education from those who benefit little or are least able
> to pay to those who derive the most direct monetary benefits or who
> are most able to pay. Either a change in the state and local tax
> structure—to make it more progressive—or a change in the system of

user charge for higher education—to charge on the basis of ability to
pay, and where necessary, to provide generous supplements to low
income students—seems called for.(Hansen & Weisbrod, 1969a, p.86).

Recommendations such as these are commonplace conclusions in the various
studies I have described. But what if systems are designed to work in the way that
they do? In other words, what if state policymakers, even if they knew the systems
were not functioning in a perfectly progressive way, were still unwilling to change
them? And if not, why not? The remainder of the chapter takes up this question.

To do so, I turn from the field of higher education finance to the field of
political economy. Political economics, broadly defined, seeks to understand the
formation of policy (typically economic policies, such redistributive programs) in
modern democracies, using the same analytical tools that are used in economics.
This means "modeling policy choices as the equilibrium outcome of a well specified
strategic interaction among rational individuals"(Persson & Tabellini, 2002, p.2).
In other words, political economy seeks to understand how rational individuals,
acting on their own preferences, can interact with one another to create stable
policy outputs, which reflect the best efforts of all involved to achieve their own
goals.

I begin this section by describing the canonical model of redistribution in a
democracy—the so-called median voter model, widely credited to Meltzer &
Richard (1981). I then briefly review some of the empirical tests that scholars have
conducted to evaluate this model. I next turn to the political economy of selective
programs, where goods are redistributed to a particular group. Finally, I turn to
the recent literature on the political economy of redistribution through higher
education subsidies, paying particular attention to the foundational work done by
Fernandez & Rogerson (1995). Last, I examine various extensions and empirical

applications of this model. Throughout this section, I intend to show how the development of formal theories in the area of political economy can explain how a majority of the population, voting with full information and awareness of the consequences of their actions, might nevertheless choose the kind of system that Hansen and Weisbrod describe.

General Results on the Redistribution of Income

Meltzer & Richard (1981) describe the most widely cited and utilized model of voters choosing a redistribution scheme based on a simple model of the economy and voter preferences. As will be shown in later sections, their very general model of the relationship of the size of government to the characteristics of the voting population has specific implications for all types of government activities, including subsidization of higher education.

In their model, Meltzer and Richards posit a static economy with one commodity being produced. Each individual works and consumes. As participants in a democracy they vote on a single policy: a proportional tax rate which will result in a single lump sum payment made evenly to every individual in the society [7]. Voters must each individually choose the tax rate that they would prefer—candidates will act on this information and choose a policy that will guarantee election by winning half of the vote plus one additional voter.

The essence of the problem facing each individual voter is a tradeoff between giving up some of their income in the form of a proportional tax, and receiving income from the government in the form of a lump sum payment. For the purposes of illustration, consider two voters, one with an income of 100 dollars a year and another with an income of 100 thousand dollars a year. A tax will be levied that will be proportional to income. Further assume that income is approximately normally distributed throughout the population, and that average income is about

50 thousand dollars

For the individual with 100 dollars of income, a tax rate of 25 percent implies a tax payment of 25 dollars and a lump sum income transfer of about $ 12,500—a net *gain* of $12,475. For the individual with 100 thousand dollars of income, a tax rate of 25 percent implies a tax payment of $25,000 and the same lump some transfer of $12,500—a net *loss* of $12,500. Under this scenario, we can predict that the low income individual would prefer tax rates to be even higher, while the high income individual would prefer a much lower tax rate.

This relationship holds true at the extremes, but as we approach the position of the median voter (the enfranchised citizen at the exact middle of the income distribution), Meltzer and Richards theoretical model predicts that the difference between the average income in the society and the income of the median voter will dictate the size of the tax rate for the hypothetical society. As Meltzer & Richard (1981) state:

> With majority rule the voter with median income among enfranchised citizens is decisive. Voters with income below the income of the decisive voter choose candidates who favor higher taxes and more redistribution; voters with income above the decisive voter desire lower taxes and less redistribution. The decisive voter chooses the tax share. When the mean income rises relative to the income of the decisive voter, taxes rise, and vice versa (Meltzer & Richard, 1981).

The implications of this model for understanding the size of government and the structure of welfare states in democracies are profound. Meltzer and Richard's model predicts that the effective redistribution in any society will be based on the distance of the middle class (those with incomes around the 50th percentile) from the poor. As the two are closer, the size of taxation, government, and

redistribution will increase. As the two are farther apart, taxation and redistribution will decrease [8]

Meltzer & Richard (1981) provide an elegant model of government size based on the characteristics of the population one which refined earlier models and inspired several reformulations and refinements in the years since (Cukierman & Meltzer, 1986; Krussell & Rios-Rull, 1999; Meltzer & Richard, 1985; Roberts, 1977; Romer, 1975). While the model is theoretically compelling, the question remains: does it fit reality? The available empirical literature on the determinants of regime type, government size, and government policy suggest that the formal electoral models constructed by Meltzer and Richard and others do describe the reality of government behavior in convincing ways (Cameron, 1978; Husted & Kenny, 1997; Lindert, 1994, 1996; Mueller, 1989; Mueller & Stratmann, 2003).

Mueller (1989) contains a survey of much of the literature that tests the predictions generated by the Meltzer and Richard Model. Among the notable examinations that have yielded positive results include Lindert (1994, 1996), who finds substantial support for the prediction that expansion of the franchise results in larger government size, using a large data set covering the years 1880-1930. More recently Mueller & Stratmann (2003) find that increased levels of democratic participation are associated with more equal distributions of income and larger governments (but also slower economic growth). I review below several of the many studies on this topic, with an emphasis on those who take up the more problematic aspects of discovering empirical support for the theoretical predictions generated by Meltzer & Richard (1981). These predictions, regardless of the difficulties illustrated by many of these studies, have found support in multiple contexts, using different data sources and modes of analysis.

One of the basic predictions made by the Meltzer and Richard model of

voting is that an expansion of the franchise will lead to an expansion of the size of government.In general, since the mean is below the median, any increase in the population voting will push the location of the median voter toward the mean of the population. In their model this will resultn an expansion of the redistribution scheme. Such an expansion should also expand the size of government, because government size must increase in order to administer ever-larger redistribution schemes. This is the question addressed by Lott & Kenny (1999). Using data from the American states, Lott and Kenny demonstrate that the extension of the franchise to women is associated with higher levels of state government spending. This occurs because the expansion of the franchise means that the position of the median voter must be lower on the income scale as more persons receive the vote. Their empirical strategy also deals with some of the problems of causality by controlling for states that voluntarily extended the franchise with states that extended the franchise only after the adoption of the nineteenth amendment.

Neoclassical economic theory suggests that increased government size, and the higher tax rates that support it, inevitably slow economic growth and should lessen prosperity. However, Slemrod (1995) begins his survey of the literature on government size and prosperity by noting a compelling feature of modern countries: there is a strong correlation between government size as measured by government spending as a percent of GDP and the overall level of prosperity in the country, measured by GDP per capita or otherwise. This finding, taken at face value, would contradict much of the literature that suggests that larger government impedes economic growth and prosperity. While there is a substantial body of evidence suggesting that intervening variables account for the positive correlation observed, these studies are hampered by issues of specification: only a very carefully selected set of independent variables will results in a negative coefficient

for government size when regressed on growth—in short, this finding is not robust to alternative specifications. Slemrod concludes that "this review of the existing cross-country literature suggests that there is no persuasive evidence that the size of government has either a positive or a negative impact on either the level of growth or the growth rate of per capita income (Slemrod, 1995, p. 401).

An expanded government does not come without cost, as Mueller & Stratmann (2003) and others point out. Schleifer and Vishany, in their book *The Grabbing Hand: Government Pathologies and Their Cures* take nearly the opposite views from Slemrod. They emphasize the multiple possibilities for governments gone bad: growth-stunting taxation corruption, and predatory regulation. They seek in their words, "to examine the consequences for resource allocation of the choices of policies and institutions made by political actors, and to consider the cures for adverse consequences of excessive political power" (Shleifer & Vishny, 1998, p.14). A particularly interesting chapter in this book examines the determinants of privatization in the provision of public services in counties in the United States. The authors find that factors that might reduce the payoffs to patronage for elected officials also are associated with higher levels of public services. This provides support for the hypothesis that the size of government is related to the amount of payoff that elected officials can extract given the institutions in place.

The robust association between democratic participation and government size may not be directly casual. Instead, these two may be related only through an indirect link. Rodrik (1996) suggests that this link may be economic openness, a feature of countries with both democratic participation and large government size. Rodrik begins with an initial finding that both government size and growth in government size are associated with more open economies. Economic openness is

measured via the share of exports plus imports in GDP. These findings are robust to alternative specifications. Rodrik suggests that this relationship is caused by the elevation of risk associated with openness. As economies grow more open, government size increases in order to provide a safe haven for some proportion of the country's economy from the shocks inherent in participation in global markets. Rodrik tests this hypothesis by explicitly measuring risk, holding the openness variable constant. In this specification, risk is highly significant both in statistical and substantive terms, while openness is no longer significant. This provides strong support for his hypothesis that government acts as a safe haven. His results contradict the received wisdom that globalization requires less government intervention, while adding support to the hypothesis that governments are acting in response both to economic and political realities.

The massive literature on democratic participation and government size has provided an enormously rich theoretical and empirical background for other applications of political economy to public policy. The next section examines the literature dealing with the more specific problem of how individuals choose among specific types of government programs, which may or may not benefit them.

Redistribution and Targeted Programs

The model posited by Meltzer and Richards does not apply to specific, targeted programs, which form the bulk of many welfare payments in developed democracies. This section will describe a general model of local public goods and a few empirical results from the literature. Higher education is a specific kind of targeted program, and the findings from this section will be applied later to the practice of redistribution through higher education subsidies.

In the formal Meltzer and Richards model described above, redistribution takes place equally across all groups within the society, with every individual

receiving precisely the same lump sum payment. However, government welfare programs designed this way are rare. Instead, most government programs are targeted on one particular group, with benefits limited to that group, but paid for by everyone. A common example would be agricultural subsidies, which nearly every government provides.

The central problem when making collective decisions about these types of policies is the centralization of resources combined with the decentralization of benefits—by definition, everyone must pay for these programs, while only certain individuals will benefit from them. (Persson & Tabellini, 1992). This is also sometimes referred to as the public choice problem: everyone must contribute to support a given policy, while not everyone in the society may benefit from the policy. In the case of higher education, no public choice problems would apply if we could isolate all benefits and costs onto discrete groups demarcated by region or income, and further by college attendance. However, the problem of redistribution through higher education subsidies comes about because of the combination of a universal tax scheme with subsidies paid out only to those who attend higher education. The additional possibility of externalities (if they exist) does not obviate this problem (Besley & Coate, 1998) [9].

In "common pool" problems such as this one, each group receives benefits that are proportional only to the number of people in the group. Agricultural subsidies, for instance, need only to be divided up among the farmers in a society. However, the payments are shared by everyone. The benefit to an individual group of any targeted welfare scheme is the ratio of the per-group-member benefit to the per-societal-member tax payment. Smaller groups therefore will demand higher targeted benefits to their group. This leads to a striking conclusion:

Concentration of benefits and dispersion of costs imply that with

centralized spending, each group retains a political incentive to demand

over-provision of goods to its own group and under-provision to the

other groups so as to avoid paying higher taxes. Which groups will be

most politically powerful in taking advantage of this opportunity

depends both on group attributes and on political and budgetary

institutions. (Persson & Tabellini, 1992)

The common pool problem provides a theoretical basis for the empirical

finding that no society provides public goods on a purely utilitarian basis. In the

area of higher education, benefits are not distributed on the basis of the costs

associated with each group. The question that can be answered making use of a

specific model of higher education subsidies is not whether the benefits of higher

education are redistributed in a progressive or regressive way, but under what

conditions we would be more or less likely to see these benefits redistributed in a

certain way. As we will see, theoretical results suggest that this depends crucially

on the voting power of those in the different groups.

Research on the common pool problem has been focused primarily on the

United States, both at the federal and state level (Alt & Lassen, 2006; Besley &

Case, 1995, 2003; Brender & Drazen, 2005; Caplan, 2001; Cuzan, 1996;

Esteller-More, n.d.; Levitt, 1999; Matsusaka & McCarty, 2001; M. Nelson, 2000;

Pujol & Weber, 2003; Wagner, 2001,?) Researchers have in general found a strong

common opposition to increased spending in general as indicated by electoral

results.

Peltzman 1992 describes electoral results for both American presidents and

governors in states as a function of spending policies of these executives. Under the

model described above, all voters will oppose increased spending on any other

group than their own, with the intensity of this preference determined in part by

their group size. Peltzman finds that increased spending on any type of program is "poisonous politically"(Peltzman, 1992, p.346). These results hold at both the federal and state level. Interestingly, this result is not ameliorated at all by deficit spending—voters seem opposed to increased spending of any kind, whether financed by increased taxation or increased deficits. Despite differences in their approaches and differing time spans, Peltzman's findings echo those of Niskanen (1975), and are supported by other studies (Besley & Case, 1995, 2003; M. Nelson, 2000).

Redistribution and Higher Education

The literature on whether and how to subsidize higher education from the perspective of efficiency or equity is quite substantial. Much of it has been covered earlier in this chapter. . However, more recently analysts have applied the methods of political economy to the analysis of redistribution through higher education subsidies. This section will review some of the major theoretical contributions in this area. In reviewing this literature, I focus on those who have theorized specifically about the issue for this chapter: can voters support a system of subsidies for higher education that is regressive?

One of the very first analyses to take this subject up from a societal perspective is G. E. Johnson (1984), which suggests that the observed pattern of redistribution might be the result of the poor in a society seeking the side-benefits available to having a more highly educated population in general. Johnson suggests that low-skill workers benefit from the advances in productivity achieved by college educated and publicly subsidized high-skill workers. Their support of higher education is therefore warranted, since their own income will go up as a result of their support of higher education subsidies.

Creedy & Francois (1990) outline a similar, but more complex, route by

which lower income individuals might come to support a subsidy scheme from which they will not benefit. The authors posit a general level of economic growth that will arise as a result of having a more highly educated population. All members of the society will be willing to invest in this public good, since all members will benefit from this investment in the future. That such a human capital investment that directly benefits a subset of the society does not necessarily dissuade those who will not benefit from supporting the subsidy, according to Creedy & Francois (1990).

Of course, it should be noted that considerable uncertainty surrounds the college investment decision, both for individuals and for the society at large. For individuals, the payoffs derived from higher education can be highly variable and are by no means guaranteed. For society, the aggregate increase in income as a result of having a more highly educated population is only possible to the extent that all people feel that they have a chance to benefit from higher education (since a suboptimal investment level may result if people are unwilling to pre-commit to financing of higher education).

These issues are considered by Garratt & Marshall (1994). They explain that higher education financing can be described as a social contract in which all parents of students provide funding for higher education, with the subsidies for higher education allotted on the basis of a lottery that is based on the skills of children. Since all parents would like their children to go to college, but can not know before having children whether or not they would benefit from going to college, they enter into an insurance contract in which all families in the society pool risk. Given this set of circumstances, it makes sense to pay for "insurance" in case one's children have enough ability to attend college. Individuals will therefore vote for such a policy—Garratt and Marshall's equilibrium results show how

voting equilibria can arise in which subsidies for a group of high ability individuals can be supported by the entire population.

The Garratt and Marshall model relies heavily on two assumptions: first, that ability can be measured in the same way across an entire population, and that the college admissions process is purely meritocratic. If either of these two assumptions fail to hold, then the process looks less like a redistribution from families with less able children to families with more able children, and more like a redistribution based on other characteristics of families, such as wealth or social connections.

Fernandez & Rogerson (1995) provide the most comprehensive model of public voting on higher education subsidies. Their model directly accounts for voter preferences for regressive higher education subsidies without relying on assumptions regarding externalities or unobservable characteristics of students. In short, their model can explain voter and official preference for a regressive system of higher education subsidies with minimal assumptions. Their foremost insight into the political process of determining higher education subsidies is that "a vote on the extent to which education is subsidized is also implicitly a vote over who receives the subsidy" (Fernandez & Rogerson, 1995, p.250)

Fernandez & Rogerson (1995) assume a society with homogeneity of skills and distinct income groups. The authors demonstrate the conditions under which a majority of the society can form an extractive subsidy policy which taxes all groups equally but provides benefits only to middle- and/or upper-income groups. The key distinguishing characteristic of societies that should be more likely to redistribute away from the poor is inequality. Societies in which the middle class are much wealthier than the poor will have lower subsidies for higher education, combined with more exclusion of the poor. Societies in which the middle class are not much wealthier than the poor will have higher levels of subsidies for higher

education, combined with lesser levels of exclusion for the poor.

Fernandez & Rogerson (1995) also demonstrate conditions under which this redistribution might in fact be efficient. They note: " in a poor economy subsidizing education may enhance efficiency by increasing attainment, whereas in a wealthy economy efficiency never is enhanced and may be decreased . . ."(Fernandez & Rogerson, 1995, p.260).

The equilibrium results of Fernandez and Rogerson's model have far-reaching implications. If correct, their findings suggest that the observed patterns in higher education subsidies, which indicate a general redistribution of wealth from the poor to the middle class and rich, may not be the result of myopia, poor information on the part of policymakers, or of policy design flaws. Instead, policymakers may be following the express wishes of their constituents by designing a program that systematically excludes a portion of the population with an anticipated exchange of votes sufficient to ensure re-election. [10]

One problematic result from Fernandez and Rogerson is that the only support for higher education will come from those who benefit from it. Bevia & Iturbe-Ormaetxe (2002) provide a model in which even those parents who have no expectation of having children attend college may decide in favor of a policy proposal that subsidizes other children to attend. The authors posit that families will seek to maximize utility in terms of their children's well being by pushing for policies that increase their children's income. One way to do this, of course, is to push for a general redistribution of income. Another way, however, would be to vote for pro-growth policies such as higher education as long as there was a reasonable expectation of high marginal tax rates along with a separate redistribution policy. As the authors state:

In our model there are only two ways for parents to transfer resources

to their children. One is to pay for the education for their own children. The other is to invest in other families' children, and, in that way influence the size of the guaranteed minimum income the children will obtain in the future. We provide that this second type of investment will be carried out, provided that the future marginal tax rate is high enough. (Bevia & Iturbe-Ormaetxe, 2002, p.337)

Like G. E. Johnson (1984)and Garratt & Marshall (1994), Bevia & Iturbe-Ormaetxe provide a framework that is based on cooperation—in all three frameworks, those who do not benefit from higher education are fully aware of this fact, and support the redistribution of resources away from their families and to others on the basis either of payment on an implicit contract (Garratt & Marshall) or as an investment in a societally optimal and personally beneficial level of higher education (Bevia & Iturbe-Ormaetxe, 2002; Creedy & Francois, 1990; G. E. Johnson, 1984).

A further issue with the Fernandez and Rogerson model is that of homogeneity of voting power among individuals. A long literature in political science has documented the ability of well-educated and well-connected individuals to shape the formation of public policy (Alford & Friedland, 1975; Bartels, 2002; Dahl, 1974). For example, Ferreira (2001) provides a model in which voting power can be concentrated as a result of initial educational inequities:

If voting power is not distributed uniformly, but increases with private wealth, a self-sustaining high-inequality trap may arise, whereby educational inequality ensures the persistence of political inequality, which in turn guarantees the continuation of educational inequality. (Ferreira, 2001, p. 549)

The evidence of differing access to government power among groups

notwithstanding, there is little reason to suspect that, beyond suffrage rules, there are systematic differences in ability to vote, particularly in western democracies. Even given the somewhat frightening results of Ferreira, it seems unlikely that educational inequality results in anything more than economic inequality. However, it should be made clear that Ferreira suggests a self-reinforcing dynamic cycle wherein not just economic but social and political power are concentrated in the hands of a few citizens, with a society that becomes more stratified with each generation. This by itself may have implications for the society as a whole, as we will consider shortly (Boix, 2003).

I will return to the Fernandez and Rogerson model in the next section. However, the discussion here illuminates several important features and weaknesses of the model in the context of the overall literature on the political economy of higher education subsidies. The model does not take into account long run dynamics of the society in the mode of Bevia & Iturbe-Ormaetxe (2002), nor does it assume much about the possible externalities or complementarities of production along the lines of G. E. Johnson (1984) or Creedy & Francois (1990) [11]. Finally, the model does not consider the possibility of heterogeneity of ability among individuals, with consequent shifts in the ability to benefit from higher education (DeFraja, 2002).

DeFraja (2002) provides a model that fundamentally questions whether spending more money on wealthier students is, in fact, a regressive system of subsides. Unlike Fernandez and Rogerson, who treat all individuals in the population as equally able and equally capable of benefiting from a higher education, De Fraja posits that individuals who are more capable are in a better position to benefit from higher education. In the maintained model, it is in society's interest to invest the most in those who would benefit the most from

higher education.

Wealthy and bright individuals in De Fraja's model may under-invest in higher education, since their parent's endowment combined with the tax rate necessary to generate subsidies for higher education will distort their labor versus leisure decision-making. The only way to ensure that they will invest in themselves is to provide them with very high subsidies. Conversely, low income but capable individuals have every reason to invest in more education, but are subject only to credit constraints. Hence, De Fraja concludes:

> ...the wealthier the household the greater subsidy: the worse-off subsidizes the better-off. The households who contribute the least to the education budgets are the wealthy households with bright children, poor households with children of average intellectual ability make the greatest contribution to the education budget. These conclusions are driven both by the need to to provide sufficient incentives to the brightest children to acquire more education, and be the fact that the poorer a household, the greater the benefit it derives from a system of public education, and therefore the greater its willingness to pay for it.

Empirical support De Fraja's model is sparse. As shown in table 1, the percentage of high income young people who attend higher education under the American system is at least as high as 95%, a figure that must approach unity once those who can not possibly benefit from higher education for some reason are left out of the calculation. But the American system of higher education is characterized by some level of redistribution of subsidies away from the very richest student, indicating that the results in the De Fraja model may not apply to the American context.

By contrast, De Fraja's point about heterogeneity of ability is strongly

supported and is an important qualification to the Fernandez and Rogerson model—there is ample evidence that the ability to benefit from a higher education varies by individuals (Heckman & Carneiro, 2003). Further refinements in the area of redistribution through higher education subsidies must take into account differential ability of individuals, and the differing impact that higher education can have on persons of different abilities.

The possible limitations pointed out by the studies cited here do not in any way take away from the strengths of the model proposed by Fernandez & Rogerson (1995). First, for the purposes of this paper, I attempt to establish only the short term decision making process of individuals voting on higher education subsidies, recognizing that a very long time horizon may be inappropriate, particularly in the context of local voting decisions. Second, as noted, the evidence mustered up until now on the externalities of higher education has been rather weak. In a small extension of the Fernandez and Rogerson model, I will model the necessary size of externalities in order to be supported by majority vote in section , and show that they would need to be quite large under the maintained assumption of their model.

The literature on redistribution through higher education subsidies provides several key insights into the dilemma originally posed by Hansen and Weisbrod. First, decisions about the subsidy for higher education are also decisions about the price of higher education, and therefore decisions about who will attend, since at any given tuition some potential students will be priced out. Second, in a democracy, these decisions take place in a strategic environment, with voters and policymakers seeking to maximize their advantages along one of several lines. Given these basic insights, theorists come to differing conclusions, depending on their assumptions about the characteristics of both policymakers and individuals. The key differences have mostly to do with inequality: to what extent are

individuals unequal in terms of income, education, political power, or academic ability? The assumptions made about any of these will inform the resulting model and results.

Further Results

The model for higher education subsidies provided by Fernandez and Rogerson sparked a rich literature, with several authors positing alternative models or extending their results. the most important of these is the work done by Austen-Smith (2003). The most important aspect of this study Austen-Smith's finding that the Fernandez and Rogerson model applies beyond just the context of education. In general, when redistribution is done by subsidies for a particular good that is not available to all citizens, there are certain characteristics of a society that will make higher or lower levels of these subsidies more likely.

Austen-Smith (2003), builds on and extends the Fernandez and Rogerson model to apply to any redistribution scheme that funds a particular good or service which is not universally enjoyed. The author suggests that Fernandez and Rogerson's equilibrium results have implications that extend beyond the field of higher education. Austen-Smith's model shares many of the features of Fernandez and Rogerson's model of higher education subsidies, but with more general implications. He posits a single good valued by all members of the society, but which is too expensive for many to afford. As with almost every country in the world, the economy in this society is characterized by a median income that is less than the mean. The redistribution scheme to be considered only provides subsidies for consumption—those who do not end up with the good or service in question receive no subsidies at all.

Austen-Smith's model depends on several further assumptions about the distribution of income in the society and the proportions of different groups who

can benefit from the good or service in question. His final results are quite intuitive. First, he answers the question, why would a majority of any society choose a policy that redistributes income on the basis of consumption of a good or service, instead of a lump sum scheme as discussed in Meltzer & Richard (1981)? Austen-Smith's model suggests that the decision to subsidize consumption takes place in two parts: first, a decision about whether to have a subsidy policy or a direct redistribution scheme, second, a decision on the tax rate for either the subsidy policy or redistributive plan.

A majority will choose the subsidy policy, under the conditions set forth by Austen-Smith:

> Although the net utility gain to the median under direct redistribution
> is positive, it is relatively small compared to that under consumption
> subsidies. In the latter case total consumption is lower and so the per
> capita subsidy for those able to afford the good is relatively high.
> (Austen-Smith, 2003, p. 1629)

The exclusionary nature of subsidizing consumption goods guarantees that the median voter under this set of assumptions will strictly prefer a subsidy policy to a general redistribution scheme, since the median and those grouped around the median will only realize a small benefit from a purely redistributive policy.

For example, consider the case of a middle-income voter. The voter can choose a pure redistributive scheme, which will tax all income proportionally and then provide a lump sum benefit of say, $1000 to every individual in the state. This person pays 1% of income, $ 500, and receives the a net subsidy of $500. However, if the policy is subsidies for higher education the person could pay the same tax, but receive a much bigger benefit. Say college tuition is $5,000, but the actual cost of college absent the subsidy is $7,500. The total benefit for this person

would then be $2,500, five times what they paid in taxes.

The wealthy group in Austen-Smith's model would favor such a plan since their net benefit would remain positive up to a much higher income level than under a pure redistribution scheme. So would the middle income voters, under a key set of conditions:

> The poorest members of the community do not consume the good although they pay taxes, while the richest members consume the good but pay more in taxes than they gain through the subsidy. Hence, the net redistribution of income and welfare is from the rich and poor to the middle income group.

This result, as Austen-Smith points out, is not only a far cry from a pure Benthamite plan, but can be quite inefficient under most circumstances. Nevertheless, an interior majority can prefer such a plan, provided one key condition holds—the median income is not too far from the mean income. To understand this result, consider the California median voter above. As this person's income declines relative to average income, the tax rate that they will pay goes down while the subsidy under the pure redistribution scheme goes up. As the lump-sum to be received under a pure redistribution scheme increases, and the subsidy to be received under the consumption subsidy policy gets more difficult to pay because of price rationing, this person will prefer a pure redistribution scheme.

Austen-Smith's extension of the Fernandez and Rogerson model suggests both that the case of higher education is not unique and that the conditions under which a subsidy policy can be obtained under majoritarian voting can be clearly described: "Subsidy policy is majority preferred to redistribution when mean income is not too much greater than median income, where 'too much' is determined relative to other parameters such as the unsubsidized consumption

price"(Austen-Smith, 2003, p.1618). Under these conditions, middle income individuals should favor a redistribution scheme that can "price out" those who make less than they do, thereby guaranteeing that only those who can afford to pay (part of) the price of the subsidized good will receive it. This prevents the good from being diluted or rationed as it would have to be under other circumstances, while still providing for government subsidies for the good or service in question.

This model provides a groundwork for extending the findings of Fernandez and Rogerson to other areas, such as cultural subsidies or subsidies for entertainment, where a general taxation scheme pays for a good or service which only a few enjoy. This is an important finding because it means that the behavioral model posited by Fernandez and Rogerson may be reflective of broader characteristics of a particular strategic situation.

Fernandez and Rogerson Model of Redistribution Through Higher Education Subsidies: an Application to the American States

This section will outline the Fernandez & Rogerson (1995) model of education spending. This model, despite its apparent simplicity, has profound implications for the study of higher education politics and policy. It provides both a theoretical and an analytic framework explaining how higher education might serve to redistribute benefits from lower income to higher income individuals without resorting to exploitation or manipulation of the political process. Instead, they show how voters acting rationally might nevertheless create a system in which the rich benefit from higher education at the expense of the poor.

I will then review their findings for possible hypotheses to be tested empirically. I am particularly interested in looking at the conditions that hold in the American states. I find that their model is directly applicable to all states

under two clearly defined circumstances, which result in clear hypotheses to be tested.

Several aspects of the Fernandez and Rogerson model are distinct from the previously mentioned literature on selective welfare policies. First, in their model, income determines exclusion restrictions. As the authors state: "a vote on the extent to which education is subsidized is also implicitly a vote over who receives the subsidy"(Fernandez & Rogerson, 1995, p.250). Since subsidies lower the price of higher education, any non-zero price for higher education will by definition exclude some individuals from attendance. However, unlike other models reviewed previously, there are no *other* exclusions restriction (e.g. grades, test scores) on attending higher education.

Second, the authors make no provision whatsoever for externalities. "We assume there are no spillovers from educated to non-educated individuals and that the returns to education are unaffected by the number of individuals that obtain an education"(Fernandez & Rogerson, 1995, p.251). This is important because many have argued that externalities are the primary reason the public subsidizes higher education (DeFraja, 2002; G. E. Johnson, 1984). While the authors do not extend the model in order to incorporate this possibility, I will take up this possibility later in this section in order to at least bound the size of the externalities that would be necessary to affect voting equilibria. In other words, I will establish the conditions under which every low income person might be excluded from higher education yet gain enough benefits from externalities that they would still be willing to subsidize others to attend.

Last, the authors assume that the cost of education itself is exogenous. This assumption greatly simplifies the model, but further work could help to clarify the role of individuals with differing preferences in affecting the costs of education. If

individuals in the model could act to make education more expensive, this could add further to the exclusion restrictions mentioned above.

Description of the Model

The economy in this model takes place over two time periods, the period before individuals get an education and the period after individuals get an education. It posits one consumption good, education. Individuals have a linear utility function defined over both periods. The future is not discounted. The society is divided into three groups with an initial income: $y_1 > y_2 > y_3$ denoting rich, middle class, and the poor, in order. Each section of the society is represented by λ_i, where $\sum_i^3 = 1$.

$E=$ represents the unsubsidized cost of education, and second period income for those who receive an education is denoted by $f(y_i)$. The authors further describe an economy in which the net increased income that individuals receive as a function of their education will always be greater than their income before receiving an education.

$$f(y_i) - E > y_i \qquad \forall i \tag{1}$$

Any individual's utility will be a function of their first period income plus γ_i.

$$u_i = y_i + \gamma_i \tag{2}$$

$$\gamma_i = \begin{cases} f(y_i) - E & \text{if } y_i \geq E, \\ y_i & \text{if } y_i < E. \end{cases} \tag{3}$$

The term γ_i summarizes the amount of education that an individual will pursue. When income is more than the cost of education, then the individual will

pursue an education, incurring cost E, but realizing increased income in the form of $f(y_i)$. When income is less than the cost of education, the individual's income will remain unchanged, making total utility over the two time periods $2y_i$.

In such an economy, many may be unable to afford an education unless some subsidy is provided. To finance this subsidy, all individuals will be taxed at a uniform proportional rate, called θ. This tax will then subsidize education at a uniform amount. [12] The result of any tax rate will be a lowered cost of education, which some larger proportion of the population will be able to afford.

This tax θ is assessed on the entire population, which has an total income of μ.

$$T(\theta) = \theta \sum \lambda_i y_i = \theta \mu \tag{4}$$

Total tax revenues are equal to θ times sum of the income in each group times the proportion in each group. Since the mass of agents is one, μ is total income and tax revenues equal θ times the total income.

At any given θ, a certain number of people will get an education. This group is represented by the term: $N(\theta)$. As mentioned previously, the given tax rate will translate into a certain per-person subsidy. This subsidy is represented as: q

$$s(\theta) = \frac{\theta \mu}{N(\theta)} \tag{5}$$

As equation (5) shows, the per person subsidy equals the tax revenues divided by the number of people who get an education. This becomes quite important later, since it leaves two possible ways to increase the per-person subsidy: increase taxes (θ) or decrease the number of people receiving subsidies (N).

$$\text{Max } j \text{ s.t.} \quad (1-\theta)y_j - E + \frac{\theta\mu}{\sum_{i<j}\lambda_i} > 0 \tag{6}$$

Where $\sum_{i<j} = 0$ for $j = 1$ Given this j (j can be either 2—the middle class[13] or 3—the poor). The authors evaluate the benefit for each group starting with the rich, then turning to the middle class and poor. For each group, the question is: what does it benefit this class to have the next class(es) down also getting some subsidy? Next, find the greatest value of $\rho_i\epsilon(0,1]$ such that:

$$(1-\theta)y_j - E + \frac{\theta\mu}{\sum_{i<j}\lambda_i + \rho_j\lambda_j} \geq 0 \tag{7}$$

For any $s(\theta)$, an individual from group i can obtain an education if $(1-\theta)y_i - E + s(\theta) \geq 0$, that is, only if the money left over after taxes minus the cost of education plus the subsidy for education is greater than zero.

If any individual from j can afford an education then all individuals from i can afford to be educated. if $\rho_j\epsilon(0,1]$ then $\rho_i = 1$ for all $i \leq j$.

$N(\theta) = (\sum_{i<j}(\lambda_i) + \rho_j\lambda_j)$

The number of citizens who receive an education is determined by the proportion of people in groups $i \leq j$ that can afford an education, plus a random selection of group j, the proportion of which are determined by the value ρ.

The expected utilities for each of the groups as a function of θ is written as:

$$EU_i(\theta) = (1-\theta)y_i + \rho_i(\theta)[s(\theta) - E + f(y_i)] + (1 - \rho_i(\theta))y_i \tag{8}$$

Fernandez and Rogerson then set out a proposition, detailing the expected utilities for certain levels of θ for each group. In effect, when deciding on a tax rate, each of the income groups— the wealthy, the middle class, and the poor—are looking for a tax rate that will allow everyone in their group to attend higher

education.

The notation for expected utilities is as follows:

$\hat{\Theta}$ is defined as the maximum value of $\theta \epsilon (0, 1]$ for which $\rho_i(\theta)$ is 0. If $y_i \geq E$ then $\hat{\theta}$ is 0. $\hat{\theta}$ bounds the lower reach of θ for individuals in group i, any increase in θ will allow more from group i to get an education.

$\bar{\theta}_i$ is the value of θ at which all members of group i can afford an education.

Fernandez and Rogerson then provide a set of propositions that describe the different $\hat{\theta}$ and $\bar{\theta}$ for each group. These proportions follow a natural course, with rich at one end and poor at the other, ranging from 0 to 1. The rich would rarely prefer a higher tax rate, since they typically can afford higher education. The poor usually want the highest possible tax rate, since they can usually not afford higher education. Each group prefers a tax rate that benefits their own group and as few of the other groups as possible. As Fernandez and Rogerson state:"Utility thereafter can alternate between decreasing and increasing as a function of θ " (Fernandez & Rogerson, 1995, p.256)

In its simplest form, the model described here pits the middle class group, y_2, against the other two groups. The middle class attempts to find a value for θ, the tax and subsidy rate, that will allow individuals from their group to attend higher education, while allowing as few as possible individuals from the low income group to attend higher education. As will be shown, only when the middle income and low income groups are sufficiently similar in income will the middle income groups begin to prefer higher tax and subsidy rates.

For their equilibrium results, Fernandez and Rogerson assume that $\lambda_i < .5$ This is a key assumption, guaranteeing that no one group in the society has a majority. Any voting equilibrium therefore results in two of the three groups agreeing on a tax and subsidy policy.

Theorem one states that θ^* and that the equilibria must be one of the set $(0, \hat{\theta}_2, \hat{\theta}_3, 1)$ But $\hat{\theta}_2$ is not an option—neither groups 2 nor 3 will ever favor $\hat{\theta}_2$. So the set is actually $(0, \hat{\theta}_3, 1)$.

Since preferences are not single peaked, there is no Condorcet winner among these options[14]. The authors therefor provide equilibria that will hold under multiple conditions. I will consider only the subset of equilibria that pertain in wealthy countries, where average income is greater than the cost of education $(\mu > E)$.

The Fernandez and Rogerson model suggests that in most cases, the rich will prefer not to pay subsidies for higher education, since they can afford to attend regardless. The middle class will most likely want subsidies that help them to attend higher education, but without providing the same benefit for the poor, since that would dilute the amount of subsidy that they can receive. The poor will almost always want high levels of subsidies for higher education, since they will be unable to attend otherwise. In the next section, I will examine the stable outcomes predicted by Fernandez and Rogerson when the middle class have sufficiently high incomes to pay for higher education, but still would prefer subsidies to defray the cost.

Equilibrium Results

In Table 2, the authors describe the predicted equilibrium outcomes under a variety of possible conditions. I will consider each of these in turn, with possible applications to the conditions prevalent in the United States. Throughout this section, I will reference Table 3 in order to discuss the types of states under which the conditions specified in table 2 may or may not hold.

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Insert Table 2 about here

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The first broad subset of conditions concerns those states in which the income of the middle class is less than the the average cost of higher education ($y_2 < E$). Under such a condition, three equilibrium results pertain. In the first two, the wealthy y_1 essentially provide an offer to the middle and lower income groups, offering first $\hat{\theta}_2$ and then $\hat{\theta}_3$, tax rates at which some middle income and then some lower income individuals would be able to attend higher education. Under these conditions, lower and middle income voters choose the highest possible tax rate, 1, and redistribute income and benefits accordingly [15]. In the third scenario, the upper income voters posit a tax rate sufficient to allow some middle income persons to attend higher education, while middle income voters suggest a policy sufficient to allow some low income persons to attend. This offer is declined by low income persons, who prefer a very high tax rate, and no equilibrium results. In the fourth scenario under section 1 in Table 2, both high- and middle-income voters favor $\hat{\theta}_3$, a tax rate under which a small proportion of low-income voters can attend higher education. Even though low income voters dislike the policy, the preferences of the first two groups form a stable equilibrium result, meaning that their preferences will prevail, and subsidies will be sufficient so that all wealthy and middle-income voters can attend higher education, along with a small number of low-income citizens.

As Table 3 shows, these conditions are unlikely to hold in the American states. There are no states where the income of the middle class is less than the overall cost of public higher education, making the scenarios outlined above exceedingly unlikely.

—————————————————

Insert Table 3 about here

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Condition 2 in Table 2 concerns a more complex set of circumstances that pertain when the income of the middle class is greater than or equal to the cost of higher education, while the income of the lower income class is less than the cost of higher education ($y_2 \geq E$, $y_3 < E$). There are two subset of equilibria when these conditions hold: when the highest income group does not receive a greater proportion of the total income of the middle and upper classes ($y_1 < \frac{mu}{\lambda_1 + \lambda_2}$), and when the highest income group does receive the greater share of income of the upper two classes ($y_1 < \frac{mu}{\lambda_1 + \lambda_2}$).

When upper income people do not control most of the income in the upper part of the income distribution, everything depends on the position of the median voter relative to the average income level. If the median voter has less than average income ($y_2 < \mu$), then two equilibria are possible: voters may choose the outcome $hat\theta_3$ under which some low income persons can attend higher education, or they may choose a complete redistributive scheme, with a tax rate of 1. However, if the median voter has greater than average income, then a majority of the population will vote for a tax rate at which some low income individuals can attend higher education. The intuition for these equilibria is that under conditions when the rich do not have too much to lose, they will be willing to vote for a relatively high tax rate of $\hat{\theta}_3$. The decision then depends on the position of the median voter relative to average income, as shown in Figure 3. When the median voter has less than average income, then a more redistributive tax policy may be preferred. When the median voter has average or greater than average income, then a less redistributive tax policy will be strictly preferred.

The second subset under condition 2 in Table 2concerns voting equilibria when the wealthy group y_1, control the lion's share of income of the upper classes ($y_1 < \frac{mu}{\lambda_1 + \lambda_2}$). Under this condition, the wealthy can only lose under any tax policy, and as a result will not vote for any taxes at all. This can be seen in Table 2, where the preferred tax rate for this group is 0 under any conceivable set of circumstances. Middle income voters under this condition may prefer a tax rate under which a few low income persons can attend higher education ($\hat{\theta}_3$), or they may choose a very high tax rate of 1—in the first case no equilibrium results, while in the second case, an equilibrium result of 1 results. Last, if the median voter has greater than average income, then the middle class group chooses ($\hat{\theta}_3$) and no equilibrium results.

As Table 3 shows, the state of the world posited under condition 2 in Table 2 does not pertain in most of the American states. While the income of middle income persons does exceed the cost of public higher education, it is also the case that the income of many low income persons also exceeds the cost of public higher education. Some possible exceptions include very poor states, where the income of the poorest and even those in the second income quintile is in fact less than the cost of public higher education.

The final set of conditions laid out in Table 2 concerns voting equilibria when the income of the poorest group is greater than the cost of public higher education ($y_3 \geq E$). Here, low income persons will still strictly prefer a highly redistributive policy, with a tax rate of 1. High income persons, on the other hand, will prefer a 0 tax rate, since even under a moderately redistributive policy such as $\hat{\theta}_2$, a large number of persons will attend higher education, and the benefit of the exclusionary benefit will be diluted to the point of being less than its cost in taxes (see equation (8)). The preferences of these two groups are clear: the poor want a high tax rate

and benefits in terms of higher education subsidies, while the rich want a low or zero tax rate, and to pay for higher education out of their own pocket.

The decision in states regarding the type of higher education subsidy policy falls to middle income voters. If middle income voters have an income that is greater than average, then they are in the same position as high income voters—any redistribution scheme will cost them more than they will receive in benefits. They will choose a low or zero tax rate under this circumstance. If middle income voters have an income that is less than average, they stand to benefit from a redistributive policy, and will vote for a high tax rate (again, see Figure 3).

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Insert Figure 3 about here

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As can be seen in Table 3, the third condition in the table of possible equilibrium results (table2) are prevalent in the American states. In general, the cost of public higher education is less than the income of those in the lowest quintile in the American states. The amount of subsidies provided for higher education in the American states can be summarized as follows:

Hypothesis 1 *When the income of middle income voters is greater than the average income (high inequality), a voting equilibrium of low subsidies for higher education will result.*

Hypothesis 2 *When the income of middle income voters is less than the average income (low inequality), a voting equilibrium of high subsidies for higher education will result.*

The implications of these results when considered over time result in a stark set of conclusions.. As Fernandez and Rogerson write:

. . . Increased inequality makes it more likely that the poor are excluded
in equilibrium. Although our model is effectively static, this result has
some potentially interesting dynamic implications. Since exclusion of
the poor may be expected to increase future income inequality,
exclusion at one date enhances the possibility of future exclusion. Thus
inequality may beget further inequality. Alternatively, economies with
a large middle class relative to the poor and rich may be expected
produce more educated individuals.

The above discussion describes the equilibrium results found under
Fernandez and Rogerson's model of voting for a redistributive education policy. I
find that under conditions that hold in most of the American states (i.e., the cost
of education is less income for many of those at the bottom of the income
distribution) , the authors posit that the key distinction has to do with the
position of the median voter relative to average income.

Externalities in the Model of Redistribution

We can use the equilibrium results in this model to answer one of the
lingering questions left from the literature on redistribution through subsidies for
higher education: could the externalities generated by those who attend higher
education account for a voting equilibrium under which all voters, including those
who do not benefit directly from higher education, support a general redistribution
of income to fund a system of high subsidies for higher education? That is, under
what conditions would the poor vote for a system of higher education that
benefited only the middle class or the wealthy?

Using the maintained model, consider the expected utility for any group i
under any tax rate, as defined in equation (8). The additional externality in this
case would be the sum of the externalities generated by all groups and individuals

that do manage to attain a higher education: $\sum_i \lambda_i e$

This amount is by necessity indivisible, and goes back to all members of the society equally in the form of a benefit ϕ. We can use this sum ϕ to examine conditions under which any group y_1 would have a greater expected utility for higher education subsidies even when they do not benefit from them.

$$(1 - \theta)y_i + \phi > (1 - \theta)y_i + \rho_i(\theta)[s(\theta) - E + f(y_i)] + (1 - \rho_i(\theta))y_i \qquad (9)$$

That is, the remaining income after paying for higher education subsidies plus externalities would have to be at least equal to the expected utility of sending a certain proportion of the population to higher education. Further assuming that $\rho_i = 0$ and the group in question had no participation at all in higher education yields the following result:

$$\phi > 1 + y_i \qquad (10)$$

In other words, the externality for any group would not have to be equal to the size of the subsidy given to any other group, but equal to the total amount of income for that group in the first period. This follows from the concept that income in the second group for educated people is $f(y_i) > E$, which means that the group in question would need an additional payoff at least equal to y_i to strictly prefer receiving externalities to actual higher education subsidies.

It is not inconceivable that these results could hold in very poor countries. In poor countries, the benefits generated indirectly through the creation of a more highly educated population could indeed be larger than the income of the very poorest group in the society, which for 20% of the world population is less than $1

a day(United Nations Educational, Scientific and Cultural Organization, 2006). In these societies, the poor may be quite willing to forgo their own education in order to receive the societal benefits of having a more highly educated population.

In developed countries, it seems much less likely that externalities could possibly be this large. In the United States, average income for those in the lowest quintile is $11,400, meaning that per person externalities for the entire population (not just low income persons) must exceed this amount(United States Department of Commerce, Bureau of the Census, 2003) . Our inability to measure externalities makes this calculation problematic, but this analysis suggests that externalities must be much bigger than previously thought to sustain any kind of voting equilibrium. In any case, it is difficult to imagine that such benefits as increased civic participation, more support for cultural activities, and other externalities from higher education are large enough to justify systematic exclusion of any single income group from attendance.

This is by no means the final word on the value of externalities from higher education. However, in the ongoing debate about the public and private benefits of higher education, this does at least provide some theoretical basis for the required size of externalities needed to justify the system of higher education currently in place.

An Empirical Application of the Model of Redistribution

In the previous section, I derived from the work of Fernandez and Rogerson a set of hypotheses regarding the distribution of appropriations for higher education in the American states. This section provides an empirical test of these hypotheses, drawing on data for the fifty states for the period 1984-1999.

As a review of the formal theory provided earlier, Fernandez and Rogerson

posit higher education subsidies as a policy whose value includes not just the explicit amount to be spent but an implicit decision regarding who will go, since sufficiently low subsidies will result in high prices for higher education which the poor can not afford. Under conditions that pertain in most of the American states, the position of the median voter relative to the average income will determine the voting position of the middle class regarding subsidies for higher education.

For the purposes of an empirical application, I seek to answer the question: to what extent does state-level inequality lead to lower or higher appropriations for higher education? This follows directly from the theory laid out in section which establishes that in a more unequal society (middle class income is high relative to average income) there will be less incentive to invest in higher education subsidies. I posit the following hypothesis: As inequality increases/decreases, state appropriations for higher education will decrease/increase.

To test this hypotheses, I examine the relationship between measures of state-level inequality and state tax appropriations for higher education in a fixed-effects model. To minimize the possibility of endogeneity, I utilize an instrumental variables approach, making use of the two stage least squares estimator. The results indicate a negative and statistically significant relationship between inequality and state tax appropriations for higher education, providing strong empirical support for the Fernandez and Rogerson model of higher education subsidies.

Data

The data for this study come from a panel dataset I constructed to track state-level information on a variety of political, economic, demographic and educational variables. Variables in the dataset were derived from a variety of sources. The source of each variable will be described in detail in the following

sections.

Dependent Variable.

The dependent variable for this analysis is state tax appropriations for higher education. Since the late 1960's, researchers at the Center for the Study of Education Policy at Illinois State University have been collecting data on higher education tax appropriations by state. (Center for Higher Education and Educational Finance, 2000). This measure, aggregated to the state level, forms the basis for the dependent variable.

In addition, this measure is made comparable on a state by state basis by reporting it on a per full-time-equivalent (FTE) basis. The figures for FTE enrollment come from the National Center for Education Statistics Integrated Postsecondary Education Data System, which surveys the universe of higher education institutions (U.S. Department of Education, 2001).

Finally, this measure is also inflation adjusted, using the Bureau of Labor statistics consumer price index (CPI) for all urban consumers. Adjusting this measure (and all other dollar measures in the study) for inflation ensures that all changes observed at the state level reflect actual changes in state funding for higher education.

This measure may be flawed in several ways. First, measuring only state tax appropriations can miss other important sources of revenues for the states. For instance, in many states lottery revenues have grown to be an important part of state funds for higher education—this data does not capture these funds. Second, many states rely on a complex mix of state and local appropriations to fund higher education, with states maintaining some level of control over the disposition of local funds.

Even with these difficulties, the indicator used in this analysis represents the

best available indicator of a state's commitment of tax funds to subsidize higher education, the exact outcome being modeled in the formal theory outlined above. A state-by-state plot of this variable against time is available in Figure 4.

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Insert Figure 4 about here

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Independent Variables.

The primary independent variable of interest is state level inequality. The measure of state level inequality to be used in this analysis is reported in Galbraith & Hale (2006). As the authors note, "the ideal dataset for constructing state inequality measures would contain individual-level income for every American-by state- in every year. Such data do not exist"(Galbraith & Hale, 2006, p. 1). To overcome this difficulty, the authors make use of industry level income data available for every state for every year from the Bureau of Economic Analysis. The authors use Theil's T statistic measured at the state level, combined with the same statistic measured at the national level [16]. The resulting measure tracks closely with Gini coefficients calculated using state-level income data using decennial census data.

Based on this high level of correlation, the authors use the linear combination of Theil statistics described above to predict the value of the Gini coefficient in each state in each non-census year. The results of this approximation are used in this study as a state-level indicator of income inequality. A state-by-state time series for this variable is displayed in Figure 5.

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Insert Figure 5 about here

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To control for possible changes in the structure of the system of higher education within states, I include two variables to describe the system of higher education within the state. First, I include a variable that measures the percent of FTE in the state enrolled in private higher education. Previous research has suggested that states with higher levels of private enrollment will have different political and policy environments than their counterparts with low private enrollment (Breneman et al., 1978; Doyle, 2004).

The second variable describing the system of higher education in the state describes the structure of the state board of higher education. The governance structure for higher education has been shown to be related to various aspects of state policy for higher education in a number of studies (McLendon, 2003). Changes in the governance system are therefore controlled for in this study.

States may also vary in their support for higher education based on the ideological position of state legislators. Recent research has indicated that the liberalism of state legislators is related to several higher education-specific policy issues (Doyle, 2004). I use the index designed by (Berry et al., 1998), which measures state-level government liberalism as a function of the voting records of that state's congressional delegation.

In looking at the effect of inequality on state appropriations for higher education, it is appropriate to control for changes in state income and production. I use gross state product per capita in order to control for the effect of broad changes in the state's economy on higher education appropriations, since I am interested in the effect of inequality regardless of general levels of income or wealth.

Last, simple demand for higher education may drive appropriations up, since having more people eligible for a service has been shown to be related to legislative demand for that service in other settings (Grogan, 1994). I include the percent of

the population aged 18-24 as a control for the effect of demand for higher education on appropriations for higher education.

Instrumental Variables.

The causal direction implied by the formal theory described in section implies that inequality will lead to higher or lower levels of state appropriations for higher education. Given the observational nature of the data in this study, the opposite direction of causality must also be entertained: it is entirely plausible that low levels of state appropriations for higher educations could cause inequality, indeed this is exactly the kind of "vicious cycle" that several authors have suggested may take place(Fernandez & Rogerson, 1995, 2003; Ferreira, 2001).

To account for the possibility of endogeneity in the relationship between appropriations for higher education and state level inequality, this study makes use of an instrumental variables approach (Greene, 2003). To satisfy the conditions required for this approach, the instrumental variables must be correlated with the endogenous variable, but not correlated with the error term in the equation relating the endogenous variable to the dependent variable.

For this study, the instrumental variables to be used measure the extent to which each state relies on extractive industries for both income and employment. Extractive industries are those which rely on specific assets located within the state, as opposed particularly to industries which rely on mobile assets such as human capital (Boix, 2003).

Research on the "resource curse"—the relationship between authoritarian and unequal regimes and a country's dependence on natural resources (particularly oil)— has demonstrated that a country that is dependent on natural resources may neglect the development of its own human capital, leading to conditions of inequality and inhibiting the growth of a democratic society (Ross, 1999; Sachs &

Warner, 2001). Further research in the American context has linked the development of legal institutions to the prevalence of natural resources in the states (Berkowitz & Clay, 2003).

The concept of the resource curse is deployed in this paper to suggest that states that have a high level of dependence on extractive industries are likely to have a higher level of inequality, a relationship that is not related to the error term in the relationship between inequality and state appropriations for higher education. Tests of the econometric specification of this relationship are held until the section on methods.

Two variables measure the extent to which states rely on extractive industries. First, the percent of income derived from extractive industries is measured on a state by state basis, using industry-level data from the Bureau of Economic Analysis. Second, the percent of the working population employed by extractive industries is also reported, using the same data source.

For the purposes of this study, extractive industries are defined as:

Mining (including oil-related industries)

Agriculture (farming)

Forestry

Logging

In effect, each of these industries combines asset specificity (the assets are tied to the physical location of the state) with an emphasis on physical as opposed to human capital. Under conditions where these industries are prevalent, research suggests that a small proportion of the population will amass a large amount of income, while most make little, resulting in high levels of inequality (Sachs & Warner, 2001).

Methods

To estimate the relationship between inequality at the state level and state tax appropriations for higher education, I make use of a fixed effects model, with an AR(1) error structure. Fixed effects are particularly appropriate in this case, as the differences among states are sufficiently large that failing to account for unit heterogeneity would lead to bias in the results. Further, a random effects specification would not be appropriate, as unit level effects are correlated with the covariates. The fixed effects model is given by:

$$y_{it} = \alpha_i + \boldsymbol{\beta}\boldsymbol{x_{it}} + \epsilon_{it}$$

Where y is the dependent variable for unit i in year t, $\boldsymbol{\beta}$ is a vector of coefficients, $\boldsymbol{x}$ is a vector of covariates, ϵ_{it} is an error term, and α_i is a group-specific error term (Greene, 2003).

I use an AR(1) error structure to account for serial correlation in the error terms within units. Failure to account for the dependence in the error structure could lead to inconsistent estimators. The AR(1) specification transforms the variance covariance matrix by an estimate of ρ_i, where ρ_i is given by:

$$\epsilon_{it} = \rho_i\epsilon_{i,t-1} + \mu_{it}$$
$$\text{Var}[\epsilon_{it}] = \sigma^2 = \frac{\sigma_{\mu i}^2}{1 - \rho_i^2}$$

Assuming that ρ_i can be consistently estimated by r_i, the data can be transformed using the Prais-Winsten transformation[17] (Greene, 2003).

Finally, since I am estimating a system of equations, I make use of two stage least squares as an estimator for the reduced form equation specific in model (12).

The two stage least squares estimator is given by:

Model Specification

The model specified in this section is designed to assess the impact of state-level inequality on higher education appropriations. To accomplish this, a system of simultaneous equations are specified, with inequality as the endogenous variable. The relationship between inequality and appropriations is identified through the exclusion of two variables in the first structural equation (11). The second structural equation specifies the relationship between state-level inequality and higher education appropriations conditional on state educational, political, and demographic characteristics.

$$\text{Inequality}_{ij} = \delta_i + \gamma_1(\text{Inequality}_{ij}) +$$
$$\gamma_2(\text{Private Enrollment}_{ij}) + \gamma_3(\text{Board}_{ij}) +$$
$$\gamma_4(\text{Gross State Product}_{ij}) + \gamma_5(\text{Percent 18-24}_{ij}) +$$
$$\gamma_6(\text{Income from Extractive}_{ij}) + \gamma_7(\text{Employment in Extractive}_{ij}) + u_{ij} \quad (11)$$

$$\text{Appropriations}_{ij} = \alpha_i + \beta_1(\text{Inequality}_{ij})$$
$$+ \beta_2(\text{Private Enrollment}_{ij}) + \beta_3(\text{Board}_{ij}) +$$
$$\beta_4(\text{Gross State Product}_{ij}) + \beta_5(\text{Percent 18-24}_{ij}) + \epsilon_{ij} \quad (12)$$

Where:

Appropriations= Appropriations for state i in year j

Inequality= Inequality measured in each state in each year

Private Enrollment= Percent of full time equivalent enrollment in private

institutions

Board= Structure of state board for higher education

Gross State Product= Gross State Product in each state in each year

Percent 18-24= Percent of the population aged 18-24

And:

γ_{1-7}=Coefficients in the first stage equation

u_{ij} is an error term in the first stage equation

β_{1-5}= Coefficients in the second stage equation

ϵ_{ij} is an error term in the second stage equation

Following hypotheses one and two, a negative and significant sign on β_1 will indicate support for the idea that increasing inequality will lead to lower appropriations for higher education. The next section details the results of the estimation of these models.

Results

This section details the results of the analysis described above. The model as specified is identified, but with weak instruments. The results are highly specific to a particular formulation of the model. Results from two-stage least squares indicate initial support for the Fernandez and Rogerson model in the context of the American states.

Specification Tests.

For a system of equations to be identified, two conditions must be met. First, the instruments excluded from the second stage equation must be correlated with the endogenous variable. Second, the relationship between the instruments and the error term in the structural equation must be sufficiently weak in order to meet the overidentification requirements.

I use two specification tests to ensure that these requirements are met. All of the results reported here refer model four in table 5, the fully specified model. To ensure that the instruments excluded from the second stage equation are correlated with the endogenous variable, I calculated the F statistic when the excluded variables are removed from the first stage equation (Bound et al., 1995). The test statistic in this case was 5.07, with 6 degrees of freedom. This indicates that the first condition is met—the excluded variables are sufficiently correlated with the endogenous variable to ensure that the instrumental variable estimates will not be biased.

In the second specification test, known as the Hausman test (Hausman, 1978), the error term from the structural equation is regressed on the instruments in the first stage equation. The r^2 term from this regression is then multiplied by the sample size. In this case, the resulting χ^2 test statistic is 20, which is statistically significant at any level. This indicates that the instruments are too strongly correlated with the error term in the structural equation to consider the model properly overidentified, and the results must be considered in the face of having weak instruments.

Estimation Results.

Results from the ordinary least squares regression of appropriations on state inequality and other characteristics are reported in table 4. As with all of the other

results reported in this section, a fixed effects model is used, meaning that results only pertain to changes within states. As Table 4 shows, inequality shows a positive and statistically significant relationship with appropriations for higher education when no other variables are entered into the equation (model 1). The zero order relationship between these two variables shows the exact opposite of the predictions from the Fernandez and Rogerson model.

Insert Table 4 about here

Yet, in the fully specified model (model 4), the coefficient for inequality is statistically significant, but negative. Only when other changes within states are controlled for does a negative relationship between inequality and appropriations surface. This indicates that the negative relationship between inequality and appropriations for higher education is dependent on the specific functional form specified in model 4.

The results from two stage least squares reported in table 5 show a similar pattern, with a negative and statistically significant relationship between inequality and appropriations for higher education. The coefficient for this variable is $12,362, with a 95% confidence interval bounded by [1,753,22,898]. As model 4 shows, an increase in inequality equal to the range reported in the data (.13) would result in a $1,600 decrease in appropriations. A more representative figure is the amount of change in inequality that occurred between 1984 and 1999 within any given state. The biggest change for this figure occurred in Connecticut, which saw a $-.07$ change in inequality over this time period, which results in a predicted increase of $862 in appropriations for higher education. Results from first stage estimates are reported in the Appendix, Table A1.

Insert Table 5 about here

These results indicate initial support for the Fernandez and Rogerson model of state subsidies for higher education. Under the parameter restrictions which most closely resemble the characteristics of American states, the authors suggest that median voters with greater than average income will prefer lower tax and subsidy rates, while median voters with less than average income will prefer high tax and subsidy rates. I find in this analysis that increased inequality (indicating median incomes approaching or greater than average) leads to lower appropriations for higher education, conditional on state educational, economic, political and demographic characteristics.

Other findings from this analysis are worth briefly highlighting. There is a statistically significant and positive relationship between state appropriations and the percent of students enrolled in private institutions, a finding that is similar to Doyle (2004), where higher levels of private enrollment were found to be related to higher levels of state financial aid. In addition, states with a higher percentage of the population aged 18-24 were more likely to have higher levels of appropriations. This contrasts with Leslie & Ramey (1986), who find that enrollment growth does not strongly affect state appropriations. Last, states with higher levels of per-capita income were also found to have higher levels of appropriations for higher education.

To further buttress the argument that high inequality leads to lower appropriations, several improvements in this empirical test could be implemented. The most important improvement involves identification of the model. Better instrumental variables would result in a more a appropriately specified model, with

fewer issues resulting from endogeneity between the independent and dependent variables. A longer time span may be able to identify an possible changes in the relationship between inequality and state appropriations for higher education. Finally, a more nuanced analysis could look at the influence of inequality on higher education appropriations to different income groups within states.

Nevertheless, these results do show that there is an empirically verifiable negative correlation between inequality and appropriations for higher education. As states grow more unequal, appropriations for higher education are predicted to go down. According to the formal theory laid in section , this is exactly what would be expected.

Implications of empirical results

In this chapter, I have argued that political economy provides an important theoretical addition to our understanding of higher education policy in the American states. As the theoretical and empirical treatment in this study shows, there is support for the conclusions reached in previous studies on the political economy of higher education subsidies.

Principally, my analysis finds that state subsidies for higher education are higher when state-level inequality is lower. This explanation is quite different than the results suggested by other authors, including (Lowry, 2001b), who uses institutional perspectives as opposed to a majoritarian voting framework to suggest that the structure of a state's relationship with its higher education sector will be determinative of institutional expenditures and tuition rates at public institutions. It is also quite different from traditional studies of higher education appropriations, which have tied state support mostly to economic and demographic characteristics of states (Hearn et al., 1996; Hearn & Griswold, 1994; Heller, 1999).

These results also have important implications for the future. As Figure 5

shows, inequality has been growing in almost every state in the union for the last two decades. Other analyses support this conclusion. Given the theoretical and empirical argument laid out in this chapter, this trend is worrisome for the future of higher education. If it is true that having a smaller and wealthier middle class relative to lower income groups leads to lower appropriations for higher education, we may well begin to encounter the kind of vicious cycle of increased inequality as a result of decreased educational opportunity described by Fernandez and Rogerson and others (Ferreira, 2001).

These results do not suggest a direct solution to this problem. The behavioral model maintained throughout this paper does not include persons acting against their self-interest, and when acting in their self-interest, the kinds of majoritarian results shown in section are predicted to hold. However, income inequality is not an inevitable outcome. Various programs, including higher education, can be supported on the basis of creating a more equitable society, an outcome which can be supported by a majority of the society when the externalities attained are deemed to be worth the costs incurred (Boix, 2003). It is beyond the scope of this chapter to discuss when those conditions might occur, but it is worth noting that they are not beyond the realm of possibility.

There are several theoretical limitations to the model laid out in section . Probably the most important, and the basis for the critique by DeFraja (2002), is that not all individuals receive the same benefit from higher education. As detailed in section , a substantial body of evidence suggests that the wage benefit that accrue to individuals who attend higher education comes about as a result of individual ability first, and the educational experience second. While we do not know the exact distribution of ability in the population nor do we know the amount of value added by higher education, it is a major simplification to assume

that all individuals in a population will receive the same benefit from higher education. A refinement of the Fernandez and Rogerson that incorporates this insight but maintains the structure of the model would provide additional insight into possible voting equilibria that may result.

Second, the model as structured does not contain any provision for income-contingent subsidy schemes. Unlike the Fernandez and Rogerson model, most of the American states do provide an additional subsidy for low income students to attend higher education, most likely making it a more progressive system than it would initially appear to be. Under the model described in this chapter, all individuals who attend higher education receive exactly the same subsidy. Further work might detail both the amount and the distribution of subsidies to individuals in different groups.

Last, and related to the above, any model of policymaking that concerns the American states must consider the federal structure of decision-making. Incorporating state-level responses to federal changes in policy would constitute a major theoretical innovation in our understanding of this area.

The empirical analysis reported in this chapter is hampered primarily by an only partially successful attempt to sort issues of endogeneity between state-level inequality and appropriations to higher education. Further research may take a different approach, making use of other quasi-experimental techniques such as differences-in-differences or regression discontinuity designs to understand the causal impact of changes in state-level economic characteristics on higher education finance.

Conclusion

The use of political economy to study the politics of higher education is still in its infancy. This chapter shows how a relatively simple model of redistribution

through higher education subsidies can accurately predict the outcomes of state policy making in the American states. The model's creators followed the standard set of assumptions made in any theoretical approach which utilizes rational choice theory: that individuals have preferences; that these preferences can be ordered; that an individual will choose the option that she prefers, given an ability to do so. Given these conditions, the rest of the results follow naturally from the structure of the model.

This approach has not been used widely to study the politics of higher education. Instead, many rely on either sociological theories that make reference to norms of behavior or structural interpretations that depend on organizational theory.

There are multiple advantages in using rational choice theory to explain the choices of policymaker. First, the assumptions that may be implicit in other theories are made explicit, particularly in the formal models presented. While simplified and sometimes stripped of the nuance that is available in other approaches, the directness and the clarity of formal modeling creates opportunities for updating and refining assumptions about human behavior that other theoretical approaches sometimes lack.

Take for instance the Fernandez and Rogerson model explicated in this chapter. The model is vastly simplified from what we know to be the real world conditions. In the the model, there are only two time periods. Individuals choose whether or not to pursue more education based only on whether the cost exceeds their income. Their choice of policy is based on the benefit to them of having higher or lower subsidies for more education. Last, all individuals in each income class have the same income, and all individuals in the society have the same ability to benefit from higher education. These conditions are not what the real world

actually looks like. Yet, given this structure, the model provides real insight into the role of income inequality on voting and policy choices.

Second, the clarity of propositions created as a result of formal modeling lead directly to empirically testable hypotheses. Because the analysis of formal models leads to posited equilibrium results, it is possible to test these results in a way that other theories may or may not be testable.

For instance, the agenda setting theory created by Kingdon (based on the Olson-March garbage can theory) posits the creation of "policy windows" under certain circumstances. Within these policy windows problems, solutions, and politics converge to create a change in the policy agenda and a possible change in policy. This theory has been cited widely in the literature on politics of higher education. However, testable hypotheses are not readily derived from this theory. Mintrom (1997) tests Kingdon's hypothesis that policy entrepreneurs can drive changes in the policy agenda. Other examples are few, because the process that Kingdon's theory describes is haphazard and, in some sense, irreducibly complex.

In contrast, theories from the political economy literature typically have clearly stated propositions that can be tested empirically. For example, Nordhaus (1975) provides an explanation of the political business cycle based on rational anticipation of elections on the part of both policymakers and voters that provides clear hypotheses about the timing of monetary policy. In short, Nordhaus suggests that policymakers will emphasize policies to maximize employment shortly before elections, while they will emphasize policies to minimize inflation shortly after elections. These results have found empirical support in the work of M. Nelson (2000).

These arguments are not intended to suggest that rational choice theory and the political economy approach ought to supplant other theories used in studying

the politics of higher education. Instead, the strengths of politically economy make it ideally suited to studying certain questions about the behavior of policymakers and voters when engaged in strategic decision-making about higher education policy.

For instance, there is a strong empirical regularity in the disconnect between demand for higher education and state support for higher education funding. A simple supply and demand model of higher education does not function well in explaining appropriations, tuition, or enrollment in higher education (G. Johnson & Leslie, 1976; G. E. Johnson, 1984; Leslie & Johnson, 1974; M. B. Paulsen, 1991).

However, viewed from the perspective of political economy, it could be that policymakers are responding to cues from the voting public that have not been observed previously. Tuition levels may be a result of rational anticipation of voter's preferences, rather than a price set in a market environment. Appropriations (as demonstrated in this paper) may be a result of voters' desire to exclude certain parts of the population from attendance in higher education. And last, enrollment may be equally a function of individuals' taking advantage of a government subsidy conferred on them by policymakers as a desire to invest more in human capital.

Policy analysis in higher education has generally assumed a Benthamite view of government—policymakers ought to do what is best for the most people at least cost. This assumption motivated much of the early literature on redistribution through higher education subsidies. As this chapter has shown such a view is extremely limiting. A theoretical perspective that takes into account the strategic motivations and limitations of policymakers, voters and other actors in the system can tell us much more about both the effects of our current higher education policies, and where those policies come from in the first place.

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Appendix

Results of First Stage Estimation

Table A1 contains first stage estimates used for estimation of final results in table 5.

Insert Table A1 about here

Footnotes

[1]McGuire's objection suggests that only parents of college-age children should be included in the calculation, as they are the only ones who *could* benefit from subsidies for higher education

[2]In a later work, Hartman (1976) argues that the proper way to analyze redistribution through higher education subsidies is by looking at the lifetime earnings and tax payments of beneficiaries of higher education subsidies–not those of their parents.

[3]The income groups represented are not exactly equivalent to income quartiles. These groupings were necessary to match data from the Internal Revenue Service with data from the National Center for Education Statistics

[4]This data comes from the national educational longitudinal study of 1988—the sample represents individuals who were in the eighth grade in 1988, and were queried in 2000 about their institution of first attendance.

[5]This data comes from the financial information reported by institutions of higher education to the National Center for Education Statistics (NCES) through the Integrated Postsecondary Education Data System (IPEDS).

[6]Heller (2005) provides similar evidence regarding the distribution of subsidies by race and ethnicity in California.

[7]All of the normal assumptions about rational voters in a direct democracy apply to this model. This includes citizens deciding on policy choices directly, voting sincerely on issues, and having single-peaked preferences

[8]This treatment of the Meltzer and Richards model is deliberately non-technical. For a complete description of the model and its implications, see Persson & Tabellini (1992) & Meltzer & Richard (1981).

[9]Again, a full description of this model is omitted, but can be found either in

Persson & Tabellini (1992) or Baron (1993)

[10]This result can be extended beyond the field of higher education. For example, (Goldin, 1999) suggests that the distribution of income in localities is critically tied to the historical development of high schools in the United States

[11]Possible externalities not included in the model include the classic possible externalities considered in the economics of education literature, such as greater civic involvement or appreciation of the arts. Complementarities of production include the ability of all individuals to benefit from a society that is generally more productive as a result of advances in human capital, even among just a few citizens

[12]Notice the distinguishing characteristic of this model from the Meltzer & Richard (1981) model and others—redistribution takes place on an exclusionary good, not on a uniform lump-sum payment

[13]In the Fernandez and Rogerson model, the income of the middle class is equal to the median income by construction. I refer to median voter and income and middle class interchangeably throughout this section.

[14]A Condorcet winner is the option that would win an election when compared pairwise with all of the other options one at a time. When no Condorcet winner exists, there are multiple outcomes that can be supported depending on other characteristics of the strategic situation.

[15]In fact, low income voters *always* choose a tax rate of 1, since they benefit the most from a pure redistributive scheme. Hence, their decision-making process is not considered in detail in these explanations.

[16]Theil's T is a measure of inequality that shares many of the properties of other inequality measures like the Gini Coefficient. The statistic ranges from 0 (perfectly equal distribution of income) to $\ln n$, where n is the size of the population. Several authors argue that Theil's T is a more flexible measure than

the Gini Coefficient, as it relies less heavily on parametric assumptions

[17]The Prais-Winsten transformation is given for each value of the dependent variable and independent variables by $x_i t - r x_i t - 1$ for all values of x and y, with a special adjustment for the first values

Table 1
Taxes, Subsidies and Net Benefit by Income, 1996

	Income Group			
	0 to 10	10 to 20	20 to 50	50 to 100
State Income Taxes Claimed	29.80	368.46	1,938.28	11,073.94
Percent Attending Public 2 year	47.03	42.31	32.45	12.67
Subsidy for 2 year	3,324.00	3,324.00	3,324.00	3,324.00
Average Subsidy, public two year	1,563.28	1,406.38	1,078.64	421.15
Percent Attending Public 4 year	27.76	32.49	42.76	45.04
Subsidy for 4 year	5,297.02	5,297.02	5,297.02	5,297.02
Average Subsidy, public 4 year	1,470.45	1,721.00	2,265.01	2,385.78
Percent Attending Private 4 year	9.99	13.97	19.60	40.80
Subsidy for 4 year	43.00	43.00	43.00	43.00
Average Subsidy, private 4 year	4.30	6.01	8.43	17.54
Total Subsidy	3,038.03	3,133.39	3,352.07	2,824.47
Subsidy-Taxes	3,008.23	2,764.94	1,413.79	-8,249.46

Table 2
Voting Equilibria in the Fernandez and Rogerson model for Wealthy Societies Only

Parameter Restrictions			$\bar{\theta}_1$	$\bar{\theta}_2$	$\bar{\theta}_3$	Equilibrium
1. $y_2 < E$			$\hat{\theta}_2$	1	1	1
			$\hat{\theta}_3$	1	1	1
			$\hat{\theta}_2$	$\hat{\theta}_3$	1	NE
			$\hat{\theta}_3$	$\hat{\theta}_3$	1	$\hat{\theta}_3$
2. $y_2 \geq E, y_3 < E$						
	$a. y_1 < \left(\frac{\mu}{\lambda_1+\lambda_2}\right)$					
		i. $y_2 < \mu$	$\hat{\theta}_3$	$\hat{\theta}_3$	1	$\hat{\theta}_3$
			$\hat{\theta}_3$	1	1	1
		ii. $y_2 \geq \mu$	$\hat{\theta}_3$	$\hat{\theta}_3$	1	$\hat{\theta}_3$
	$b. y_1 > \left(\frac{\mu}{\lambda_1+\lambda_2}\right)$					
		i. $y_2 < \mu$	0	$\hat{\theta}_3$	1	NE
			0	1	1	1
		ii. $y_2 \geq \mu$	0	$\hat{\theta}_3$	1	NE
3. $y_3 \geq E$						
	a. $y_2 > \mu$		0	0	1	0
	b. $y_2 < \mu$		0	1	1	1

Table 3

Income by Quintile and Costs of Higher Education in the American States, 1999-2000

State	Cost per FTE	1st Quintile	2nd Quintile	3rd Quintile	4th Quintile	5th Quintile
Alabama	21945	9546	23510	40404	62000	99050
Alaska	25749	15000	34004	52112	77040	120807
Arizona	15471	11000	22752	36001	57000	99476
Arkansas	20609	9500	22000	33256	50919	85080
California	19158	11328	24047	40000	63500	113200
Colorado	17399	15000	31000	48738	72000	115500
Connecticut	23924	14592	33628	56331	86000	141679
Delaware	22865	12330	30056	47870	69338	108929
Florida	14956	11212	24257	38961	60000	101076
Georgia	19981	12000	26000	42020	62274	102550
Hawaii	23042	11975	29262	47096	74067	124212
Idaho	16754	11660	24210	38850	56130	92425
Illinois	16897	13176	30832	50040	73889	120600
Indiana	20925	13150	29751	45050	63203	102412
Iowa	24446	13278	27500	44325	63300	103808
Kansas	16091	11913	26300	43300	61433	102500
Kentucky	21886	10400	24500	40633	63535	107592
Louisiana	21457	7950	21000	35000	55734	94479
Maine	18655	12582	27013	41300	61820	102131
Maryland	20628	15000	35000	57851	83240	141615
Massachusetts	18486	11910	27642	49512	75453	130999
Michigan	24455	12716	30402	50642	74755	123800
Minnesota	19169	15000	33500	54046	76351	120100
Mississippi	20435	9132	20334	34242	52912	89215
Missouri	19432	12820	30100	47200	66293	103316
Montana	17177	9100	20607	35004	51659	84098
Nebraska	19321	11653	26048	42790	63942	99868
Nevada	15747	13824	28034	42438	63000	110000
New Hampshire	18876	15000	33004	50693	75030	126973
New Jersey	21629	13881	33020	55116	82500	142904
New Mexico	24923	8916	20200	34338	53895	84824
New York	30877	9246	24261	42224	67592	119207
North Carolina	21343	10943	24632	40949	62200	105896
North Dakota	16535	10595	22526	37364	56100	86104
Ohio	20839	12000	28692	47437	69404	113866
Oklahoma	18549	10194	24033	37396	56382	96550
Oregon	25543	10800	25000	40895	61160	102520
Pennsylvania	23917	12420	28946	47000	70646	117152
Rhode Island	16951	10188	27000	47996	71405	116440
South Carolina	18896	12000	25180	40220	61000	98880
South Dakota	13616	12234	26480	41001	60200	97500
Tennessee	15911	10969	24077	39001	59000	104500
Texas	20339	10125	23000	37000	58010	100745
Utah	23581	14346	32334	48800	67616	105606
Vermont	27640	11572	26500	42400	61598	102469
Virginia	20046	13836	32229	51945	79400	133040
Washington	21172	12420	29600	47054	69610	113600
West Virginia	14748	8814	20065	32926	50800	86199
Wisconsin	20412	13489	30277	50000	71700	111000
Wyoming	17489	11615	26080	40266	58000	91322

Table 4

Results of OLS, Dependent Variable=Inflation-Adjusted Per Student Tax Appropriations

	Model 1	Model 2	Model 3	Model 4
Inequality	2215.20	-174.79	-312.69	-9292.41
	(4369.33)	(4434.20)	(4448.28)	(4173.44)
Percent of FTE in Private s		6687.86	6718.81	5699.60
		(1996.38)	(1999.17)	(1854.14)
Board: Centralized Four Year		-181.44	-183.92	-269.28
		(468.80)	(469.09)	(406.84)
Board: Strong Coordinating		89.93	81.90	312.04
		(457.94)	(458.62)	(396.58)
Board: Weak Coordinating		78.96	74.85	231.55
		(488.36)	(488.73)	(423.44)
Liberalism			75.24	249.28
			(188.21)	(178.14)
Percent of Population 18-24				332.91
				(61.63)
Gross State Product (Per Capita)				0.15
				(0.02)
Intercept	4347.71	3781.18	3797.35	-484.73
	(426.27)	(427.94)	(428.50)	(747.74)
Fixed Effects	Yes	Yes	Yes	Yes
R^2 (Within)	0.00	0.02	0.02	0.15
F	5.95	4.68	4.63	12.32
N	750.00	750.00	750.00	750.00

Table 5

Results of Two Stage Least Squares, Dependent Variable= Inflation Adjusted Appropriations per FTE, Endogenous Variable= Inequality, Instruments: Employment and Earnings from Extractive Industries

	Model 1	Model 2	Model 3	Model 4
Inequality	13229.19	8512.64	8432.84	-12326.14
	(7254.00)	(4097.57)	(4110.56)	(5394.17)
Percent of FTE in Privates		4767.11	4841.60	4978.99
		(2301.36)	(2294.37)	(2450.73)
Board: Centralized Four Year		-183.30	-178.25	-116.92
		(488.66)	(488.58)	(454.06)
Board: Strong Coordinating		-15.35	-15.50	301.31
		(481.11)	(480.99)	(452.10)
Board: Weak Coordinating		-19.23	-16.87	170.46
		(511.03)	(511.09)	(476.70)
Liberalism			44.18	315.36
			(200.28)	(205.67)
Percent of Population 18-24				383.78
				(80.98)
Gross State Product (Per Capita)				0.14
				(.02)
Intercept	-296.66	678.50	665.87	865.43
	(3069.36)	(348.24)	(348.81)	(393.59)
Fixed Effects	Yes	Yes	Yes	Yes
R^2 (Within)	0.06	0.03	0.03	0.16
F	N/A	4.75	4.68	11.52
N	772.00	722.00	722.00	722.00

Table A1

First Stage Estimates: Endogenous Variable= Inequality

	Model 1	Model 2	Model 3	Model 4
Percent of Income: Extractive Industries	0.02	0.02	0.01	0.00
	(0.03)	(0.03)	(0.03)	(0.03)
Percent of Employment: Extractive Industries	0.56	0.51	0.51	0.41
	(0.13)	(0.13)	(0.13)	(0.13)
Percent of FTE in Privates		0.14	0.13	0.15
		(0.02)	(0.02)	(0.02)
Board: Centralized Four Year		0.01	0.01	0.01
		(0.00)	(0.00)	(0.00)
Board: Strong Coordinating		0.01	0.01	0.01
		(0.00)	(0.00)	(0.00)
Board: Weak Coordinating		0.01	0.01	0.01
		(0.01)	(0.00)	(0.01)
Liberalism			0.00	0.01
			(0.00)	(0.00)
Percent of Population 18-24				0.00
				(0.00)
Gross State Product (Per Capita)				0.00
				(0.00)
Intercept	0.39	0.36	0.36	0.26
	(0.00)	(0.00)	(0.00)	(0.00)
Fixed Effects	Yes	Yes	Yes	Yes
R^2 (Within)	0.03	0.10	0.11	0.27
F	-0.68	0.20	0.25	2.15
N	722.00	722.00	722.00	722.00

Figure Captions

Figure 1. Income of Males and Females Aged 25-44, by Level of Education

Figure 2. Distribution of Income by Postsecondary Attendance, 1999

Figure 3. Possible Distributions of Income and Preferences of Median Voter

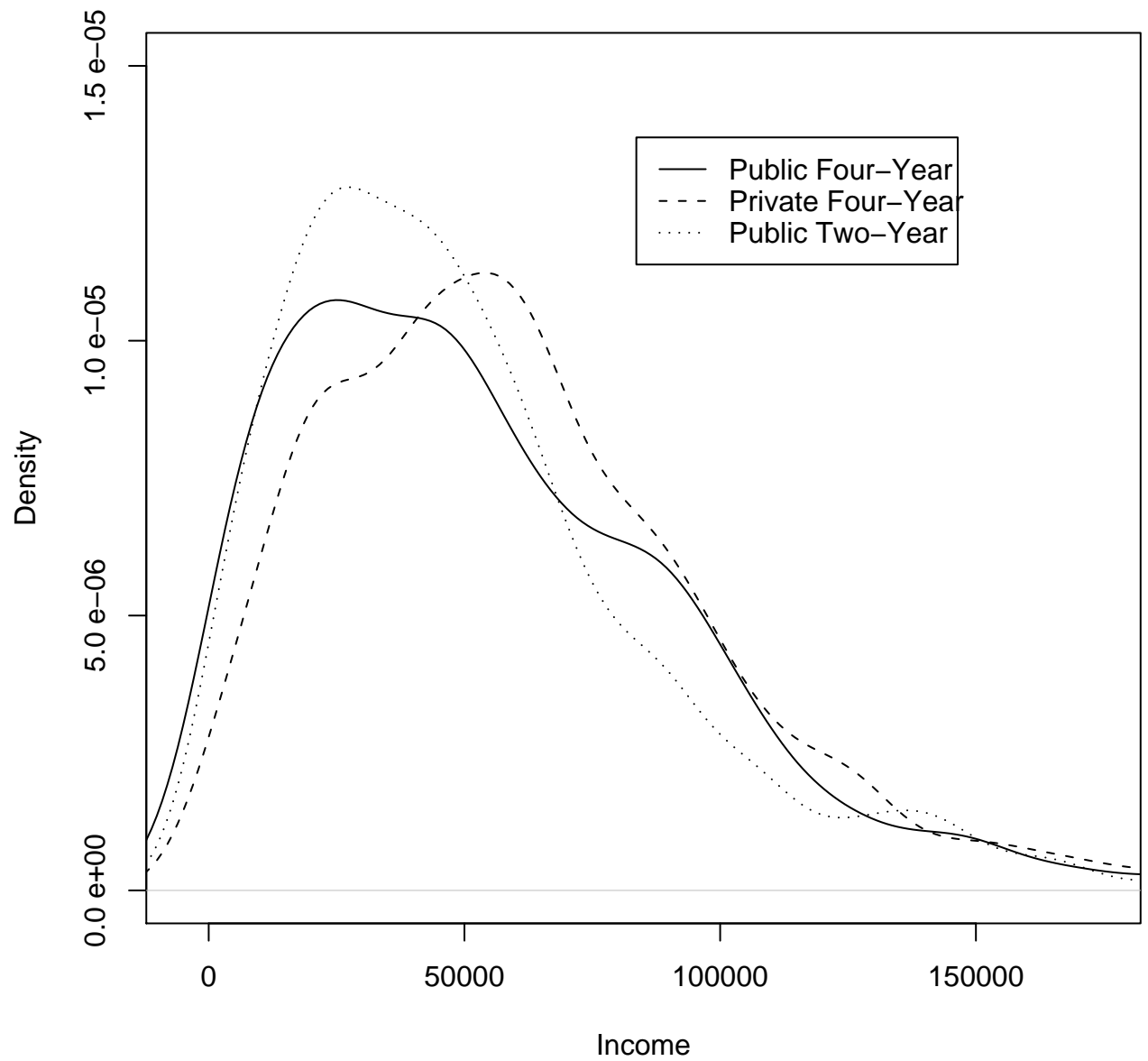*Figure 4.* State Appropriations per FTE (Inflation Adjusted), 1984-1999

Figure 5. State Level Inequality, 1984-1999

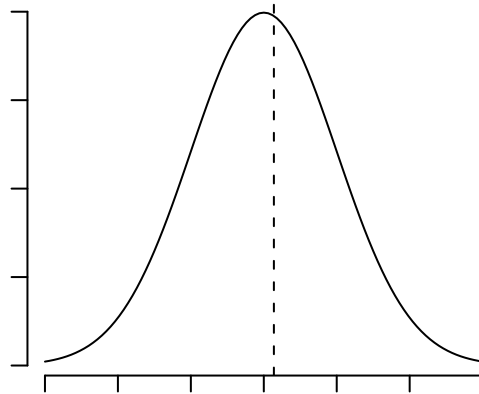Redistribution through higher education subsidies, Figure 1

Income for Men

Income for Women

Source: United States Census Bureau, 2004

Redistribution through higher education subsidies, Figure 2

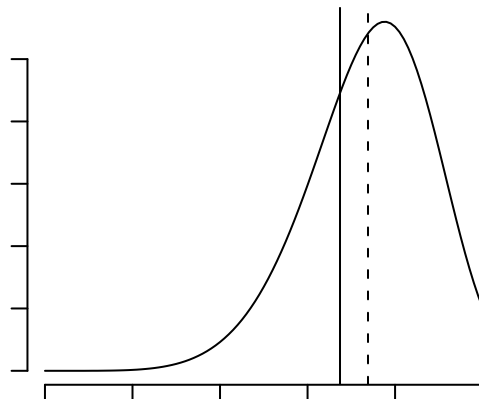Source: National Postsecondary Student Aid Survey, 1999
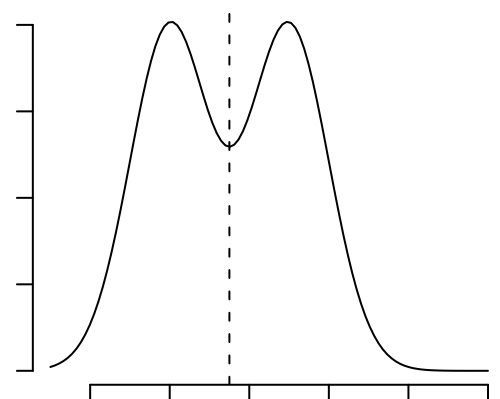
Symmetric:
Mean and Median Income Are the Same

Positive Skew:
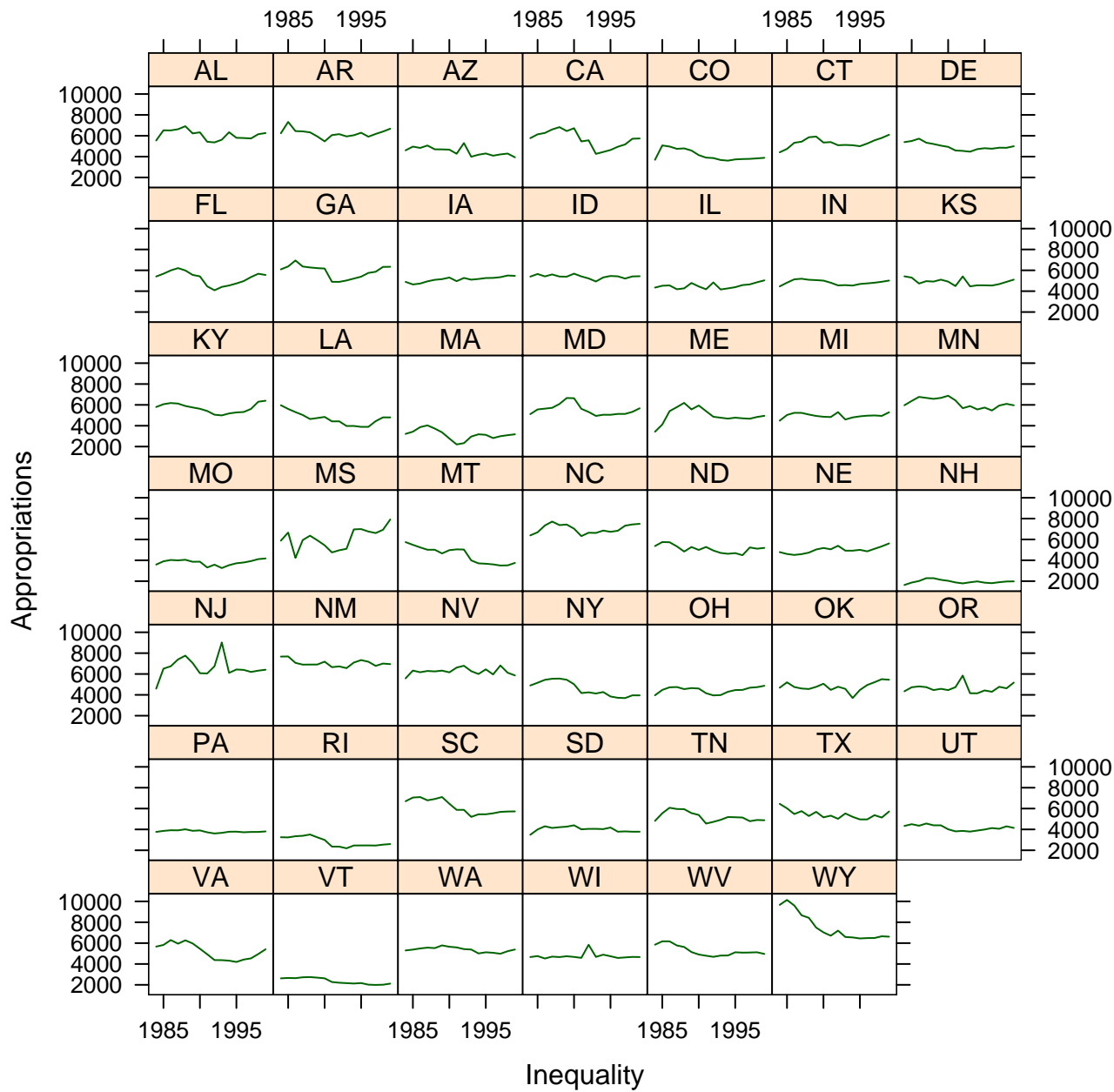**Median Voter Prefers More Taxation**
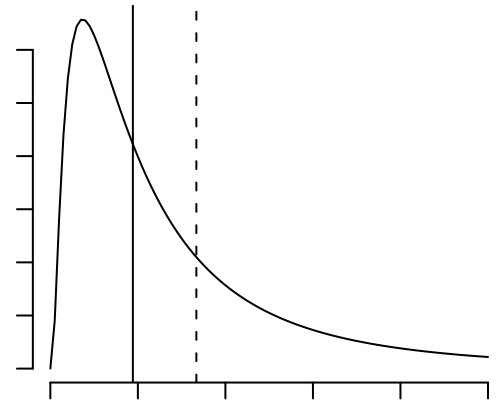
Negaitve Skew:
Median Voter Prefers Less Taxation

Bimodal:
No Differnce in Mean and Median

Redistribution through higher education subsidies, Figure 4

Redistribution through higher education subsidies, Figure 5