Social Capital and Household Income Distributions in the United States; 1980, 1990

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SOCIAL CAPITAL AND HOUSEHOLD INCOME DISTRIBUTIONS IN THE UNITED STATES; 1980, 1990

Table of Contents

I. Executive Summary

This report asked if changes in income inequality and the level of income were associated with changes in social capital or the strength of relationships. Social capital is defined in this report as sympathy (antipathy) for others, idealized selves, and things. Social capital has received increasing attention by scientists across several disciplines. Changes in social capital are expected to produce the following important economic consequences. First, increases in social capital are expected to alter the terms of trade and to increase the likelihood of trades between friends and family. Second, increases in social capital heighten an economic agent's concerns for the external consequences of his or her choices on friends and family. Third, increases in social capital increase the likelihood that an organization will act to benefit the entire organization. Fourth, increases in social capital increase the opportunities for specialization and improved efficiency because of increases in trades. Finally, all of the economic consequences of increases in social capital tend to raise the level of income and reduce the disparity of income.

This report tested empirically the relationship between changes in social capital indicator variables and changes in the distributions of household incomes. To perform the empirical tests, social capital indicator variable data were gathered. To measure household income distributions, household income data were obtained using the 1980 and 1990 U.S. Census. Social capital indicator variables selected to measure changes in social capital included measures of family integrity including the rate of households headed by single females with children; education achievement variables including high school graduation rates, crime rate variables including litigation rates, and labor force participation variables. The social capital indicator variables appeared to be significantly correlated with each other. However, in 1980, the rate of households headed by single females with children was not significantly related to birth rates from single teens. By 1990, however, a strong correlation was found between the rate of households headed by single females with children and the rate of births from single teens.

Income inequality among U.S. households measured using coefficients of variations (CVs) increased between 1980 and 1990 in all 50 states. The largest increase in income inequality was among White households. The smallest increase in income inequality was among Asians households. The states with the largest increase in income inequality measured by the ratio of 1990 and 1980 CVs were Arizona, Wyoming, Maine, Vermont, and Texas. Half of the states reported decreases in real household income between 1980 and 1990. Those states with the largest percentage decrease in real income were Wyoming, Alaska, Montana, Louisiana, and West Virginia. Connecticut, New Jersey, Rhode Island, and Massachusetts reported the largest percentage increase in real income.

State CVs and average household incomes were estimated as a function of four factors or subsets of the social capital indicator variables. The four factors used to predict income disparity and average level of household income were generally significant with the level and disparity of household income. Thus, the findings of this report support the conclusion that changes in social capital has a significant effect on the disparity and level of household income.

Social Capital and Household Income Distributions in the United States; 1980, 1990

II. Introduction

Income and wealth inequality has been on the rise in the U.S. since the 1970's. Evidence of income inequality is the percentage of total income earned by the highest income families and the percentage of total income earned by the lowest income families. According to recent Census Bureau data, the top 25% now receive 44.6% of U.S. income. The lowest 25% earn 4.4%. This is the widest rich-poor gap since the Census Bureau began keeping in 1947 (Bernstein).

In addition to the increasing income disparity trend are important social trends. Putnam (1995) claims that Americans volunteer less, are less engaged politically, have declinging education standards, face rising crime rates, and have lost the sense of security due to changes in the work place. Putnam suggests that the social changes just described indicate a decline in social capital or in the quality of our relationships. Others scientists dispute Putnam's findings claiming that instead of a simple decay in civic engagement, it is more useful to think of shifting civic and community engagements (Clark).

At issue is the following question: *Do changes in social capital, however measured, influence the level and disparity of household income in the United States?* The evidence presented in this paper suggests that changes in social capital and changes in income distributions are related in important ways.

Relationships and Terms of Trade

Income and wealth levels are largely dependent on the terms of trade at which one exchanges his or her goods and services. Terms of trade can be defined as the agreement between economic agents that determines the quantity, quality, risk, price, information content, timing, and location of goods and services traded. In many experiments, relationships appear to have altered the terms of trade. The evidence suggests that friends and family trade more and at different prices than do the estranged and strangers.[1] Since relationships appear to influence the terms of trade and the terms of trade determine income distributions, then relationships must also influence income and wealth distributions.

Examples of relationships altering the terms of trade include the following. Graduate students in the Department of Agricultural Economics at Michigan State University would sell a used car valued at $3,000 for $420 less than its market value if the buyer were a friend. However, these same graduate students would require $697 above the market price if the buyer were an unpleasant neighbor (Robison and Schmid, 1991). A survey of 103 Michigan bankers serving communities of less than 10,000 found that good business and social relationships increased the probability of loan approval in some cases by 60% (Siles, Hanson, and Robison). Survey respondents reported that their willingness to bear risk depended on the consequences of their risk decision on important others (Robison and Hanson, 1996). Finally, relationships have been significant factors in customer retention, tipping behavior, data perception, and willingness to cooperate (Robison and Hanson, 1995).

When farmland sales are recorded, a distinction is made between land sales between family members and "arms-length" sales made between unrelated individuals. The distinction is made because realtors recognize that the sale price of land depends on the relationship between the seller and the buyer (Gilliland). Nepotism laws restrict government employers from hiring their close relatives. These laws recognize the tendency of some government employers to grant employment advantages to their relatives. Civil rights laws preclude employment being denied because of one's race. These laws recognize that race often changes the relationship between employers and potential employees. Finally, our judicial system emphasizes the role of relationships by placing a blindfold on our symbol of the court, Lady Justice. The blindfold helps her make impartial judgments free from the bias created by her knowing who is to be judged.

Families represent an organization in which a special relationship exists. One way this special relationship manifests itself is in the formation of business agreements. Gwilliam found that 89% of Michigan farmland leases were between friends and family members. Johnson et al. found that farmland leases between related individuals were often oral and more successful than written leases between

unrelated lessees and lessors. Nelton noted that family businesses account for 76% of Oregon's small companies. In addition, Calonius wrote that 75% of U.S. companies are family-owned or controlled.

Relationships between individuals and causes represented by particular organizations account for substantial amounts of voluntary donations. Despite a sluggish economy, philanthropic giving across the nation in 1991 exceeded donations in 1990 by 6.2%. Voluntary donations in 1991 equaled $124.7 billion of which individuals contributed 89%. The largest recipients of philanthropic giving included religious and educational organizations. Other recipients included environmental groups, the arts, health organizations, and other nonprofit groups providing human services (Tetsch).

Changes in Income Levels and Income Disparity

It is generally agreed that uneven income distributions may have serious social and economic consequences. Addressing the question: what are the five biggest challenges Clinton faces in his second term in office?, Professor George J. Borjas of the John F. Kennedy School of Government wrote that Clinton's number one challenge was to address income disparity. Professor Jeffrey Rosensweig of the Goizueta Business School, Emory University wrote that the number one challenge was to ease the gulf between rich and poor and keep the middle class from hollowing out.

It has been argued by some economists that there is a tradeoff between increasing incomes and reducing income inequality. One view attributed to Kaldor is that a high level of savings is a prerequisite of growth, and since the rich save more than the poor, growth requires the income should be concentrated in the hands of the rich whose savings rates are high. A second view suggesting the tradeoff between income growth and income inequality is attributed to Kuznets. His view was that as labor shifts from a low productivity sector to a high productivity sector, aggregate inequality must initially increase substantially and only later decrease. This latter view, Robinson observed, has "acquired the force of economic law." The validity of this law, however, is not universally accepted. Commenting on Kuznets' law, Fields wrote:

> *Perhaps one of the greater ironies in the history of thought on economic development is that the economic law which today is most often associated with Kuznets and that has come to bear his name the idea that income inequality increases in the early stages of economic development and decreases in the later stages, thus tracing out an inverted-U curve receives remarkably little empirical support, either from the evidence presented in Kuznets' writings or in subsequent data (G.S. Fields, p. 462 in "The State of Development Economics: Progress and Perspective").*

Deininger and Squires used an expanded data set covering 30 years to test for the presence of the Kuznets' curve. They found no evidence of the Kuznets' curve in almost 90% of the cases they examined.

Other explanations for the increasing wealth and income disparity include falling wages for unskilled workers as automation spreads, low tax rates on the wealthy during the 1980's, low minimum wages, the decline of trade unions, and the rapid rise in the 1980's of the stock and bond markets, in which the wealthy are heavily invested (Bradsher).

It appears important work remains to be done before economists agree on the causes of income inequality. To improve our understanding of the causes of income inequality, this study considers the possibility that relationships may be a significant factor in explaining income inequality.

What follows is a report of research efforts that examine the connection between relationships and income distributions. After the introduction, sections III and IV define social capital and describe its properties including opportunities for investments and disinvestments. Sections V and VI describe how social capital internalizes externalities and in the process alters terms of trade. Sections VII and VIII describe how social capital influences income distributions and develop several hypotheses. Sections IX through XIV test the connections between social capital and income distributions using U.S. Census data for 1980 and 1990 and indicator variables for the same period. Finally, section XV summarizes the report.

III. What is Social Capital?

Relationships and Social Capital

Person i is said to have a relationship with person, place, or object j, if changes in j's well-being perceived by i change the well-being of person i. Besides relationships with other persons, objects of relationships may include communities, schools, clubs, animals, organizations such as churches and service clubs, and legal institutions. The relationship person i has with person, place, or object j depends on at least two elements. The first element is awareness or "social distance."(d_{ij}) Social distance measure i's knowledge of j that may include information about j's behavior, consumption, wealth, values, and social bonds. As i's knowledge of j increases, i's social distance to j decreases. For those individuals, groups, communities, or institutions j about whom i has no knowledge, i's social distance to them is infinite and i has no relationship with them. Consequently, if i has no relationship with j, then changes in j's well-being do not influence i's economic behavior.

The second element that determines i's relationship to j is the degree of sympathy (antipathy) that i holds toward j, $r_{ij}>0$, ($r_{ij}<0$). Person i may develop toward j feelings of sympathy, antipathy, or neutrality (Bogardus). We have observed that relationships between persons tend to be symmetric; that i cares for j about the same as j cares for i.

If person i's sympathy toward j increases or if person i's social distance toward j decreases in the presence of sympathy, then person j's well-being is expected to increase for the following reason. Since an improvement in j's well-being also benefits i vicariously, individual j can expect person i to extend favors, preferential terms of trade, and in other ways look out for j's interest as long as the favors, preferential terms of trade, and other benefits extended do not impose a cost to i greater than the vicarious benefits earned as j's well-being improves. The potential benefits j can expect from i resulting from i's relationship with j is called here j's social capital and is defined next.

Social Capital: A Definition

Definition. Social capital is the sympathy (antipathy) person i has toward another person, group, or object j. As a result of i's sympathy (antipathy), j has the potential to receive from i benefits (harm), advantages (disadvantages), and preferential (discriminatory) treatment. Social capital also includes person i's sympathy (antipathy) toward his idealized self. Social capital may be culturally dependent, environmentally influenced, and responsive to a wide range of stimuli including the perceived social capital claimed by others.

The above definition of social capital is attributed to the work of an interdisciplinary team of social scientists at Michigan State University consisting of sociologists, political economists, agricultural economists, and public affairs specialists.

Other definitions of social capital include: (1) the social obligations or "connections" which are convertible into economic capital under certain conditions (Bourdieu); (2) a resource of individuals that emerges from their social ties (Coleman, 1988); (3) the ability to create and sustain voluntary associations (Putnam); (4) trust (Fukuyama); and (5) the relationship or caring between persons and between persons and their institutions (Robison and Schmid, 1994).

Coleman discussed social capital and its application to sociology.[2] Hyden discussed social capital in a political science setting. Putnam suggested recently that the supply of social capital in the United States has decreased. Fukuyama associated social capital with trust and suggested that trust or social capital is at the foundation of collective action. C. Flora and J. Flora discussed the importance of social capital in maintaining society's social contract. Robison and Schmid (1991, 1994), Robison and Hanson (1995, 1996), and Schmid and Robison discussed the role of social capital in economics. Finally, Evans and Fox have written about the role of social capital in development.[3]

Economic Properties of Social Capital

Social capital and other forms of physical capital have many features in common. Like physical capital, the benefits or service potential of social capital can be depreciated through neglect and the passage of time. Like physical capital, social capital can sometimes be enhanced or depreciated by extracting services. For example, asking a friend for a favor or improved terms of trade in an economic transaction may reduce the likelihood the friend will extend favors in the future. On the other hand, granting favors and extending favorable terms of trade may increase one's social capital and increase the likelihood of receiving favors in the future. Finally, like financial capital, social capital has certain fungible properties. For example, an owner of social capital may be able to secure social capital services or alter the terms of trade for another party using his or her social capital. For example, one may ask a friend to benefit another person he/she doesn't know.

Perhaps one of the most interesting aspects of social capital is that it provides a new perspective on goods and markets. Traditionally, economists have described goods as objects with properties wanted by consumers. For example, a good may be wanted because of its temperature, taste, sight, place, form, location, or ability to create physical sensation. Exchange prices and amounts of the goods exchanged were then said to depend on incomes, marginal utility for the good's properties, and the cost of supplying the good. Social capital theory suggests that the desirability of a good may be modified by the relationship between the consumer and the supplier of the good. It also suggests that what is being exchanged in addition to money and goods and services is goodwill or social capital.

In some markets, goods may be exchanged for social capital only. For example, one neighbor may provide another neighbor an item such as a cup of sugar and refuse money as payment. The neighbor supplying the sugar may refuse payment because the increase in social capital he or she receives by supplying the sugar is valued more than the money value of the cup of sugar. In other exchanges where the good is of significant value, a good may be exchanged for both money and increased social capital. Consider, for example, the exchange of a used car. The seller of the used car may offer it at a discount to a friend or family member. The car seller receives less than the market value of the car plus an increase in social capital worth more than the discount offered the buyer.

Another important economic property of social capital is its ability to reduce transaction costs. High monitoring costs, threats of litigation, price, quantity, and quality discovery costs and the costs of writing contracts that consider many contingencies may all be reduced by increases in social capital between trading partners. These transaction costs are reduced by increases in social capital because each party to the trade has his well-being linked to the well-being of his or her trading partner.

The importance of social capital's ability to reduce transaction costs has important implications. In some markets, especially in less-developed countries, transaction costs are very high. As a result, opportunities for trades between strangers are limited. However, social capital's ability to reduce transaction costs, especially between friends and family, allows trade patterns to develop between the socially close. Thus, in markets with high transaction costs, the percentage of trades involving social capital is much higher than in markets with low transaction costs. Consequently, high levels of social capital can provide some economic advantages. Other reasons for expecting increased trades between family and friends follow.

Another property of social capital is its ability to change the terms of trade. Suppose a person has an object for sale, such as a reliable used car. The car seller expects his well-being to be improved by exchanging the car for money in the amount of the car's "arm's-length" value. Now suppose that the car seller has a friend who needs a car like the one being sold. The car seller recognizes that if his friend owned his car that he would benefit vicariously from the improvement in his friend's transportation services. Selling his car to his friend, the car seller reasons, would improve his well-being in several ways. First, he would benefit from the money received from selling the car. He would also receive some satisfaction from knowing his friend has reliable transportation. The car seller may also feel good about his relationship to himself, knowing that he assisted his friend's own reliable transportation services. Finally, the car seller may benefit as a result from the car buyer's improved goodwill as a result of the car purchase. Thus, the car seller received more benefit from selling to his/her friend than to a stranger or enemy.

Moreover, the car seller could sell at a price below the market price and still be better off than selling the car at the market price to a stranger. The result of the social capital in this instance is the willingness of the seller to offer more favorable terms of trade to the friend so that the likelihood that trades will occur between friends is increased.

Not all economic properties of social capital are considered beneficial. Consider some possible negative consequences of social capital. One negative consequence is that social capital may lead to agreements that are not economically sound. For example, a parent may employ a son or a daughter in the family business and pay them a wage higher than would be expected in a strictly "arm's-length" economic exchange. Employees may receive benefits from their employer because of social capital rather than on-job performance. Such job discrimination practices are resented by employees without social capital and may lead to labor unrest. In other cases, organizations may form based on certain social capital building traits that exclude others. Such organizations have been called good old boys' and good old girls' clubs. Particularly improper when terms of trade results from social capital favors are extended in public work places when those extending favors are allocating public funds on criteria other than expected public benefits resulting from the expenditures.

Finally, it should be observed that clubs, service organizations, corporations, communities, families, and schools may all claim social capital from individuals. Then, organizations endowed with social capital and other resources obtained from individuals may establish rules and operating procedures that make its resources available to its members or others. In other words, because of social capital, institutions may endow its members with potential benefits (harms), favors (disadvantages), and preferential (discriminatory) treatment.

IV. Investments and Disinvestments in Social Capital

Economic activities between economic agents *i* and *j* may increase or decrease their levels of social capital. Whether or not economic activities involving agents *i* and *j* produce investments or disinvestments in social capital depend at least in part on whether or not the economic activities involving persons *i* and *j* are competitive or synergistic.

Investments in Social Capital

Investments in social capital likely occur when individuals participate in synergistic or cooperative activities. Synergistic activities are those in which one agent's success improves the likelihood of another agent's success. Synergistic activities often build social capital because the agents engaged have an interest in each other's success. Then, because they are interested in each other's success they are more likely to communicate, join common causes, offer favorable terms of trade, share responsibility, develop emotional and social ties, and interact in still other synergistic activities, all of which increase social capital. Examples of social capital building activities include informed free trades, sharing information, transfer of gifts more valuable to the receiver than the giver, and joining and participating in service activities of service clubs, churches, schools, professionals, and civic organizations.

Agents who have common traits are more likely to engage in synergistic activities than agents who lack common traits. Some common traits that have been the basis of sympathetic relationships include gender, economic status, occupation or profession, enemies, memberships in organizations, manners of dress, marital status, age, education, location of home and work, political preferences, race, religious preferences, family background, language, national origin, moral values, and genealogy. Some traits such as race, family, national origin, and genealogy have longer lives and are therefore likely to provide a more stable basis for social capital than shared economic opportunities.

Investing in social capital through personal contact is limited by one's time and means of communicating and relating with others. Some organizations can increase the efficiency of one's efforts to build social capital in at least two ways. First, organizations such as service organizations, social clubs, and religious organizations may improve the efficiency of one's social capital investment efforts by increasing the opportunities to meet and communicate with others. Second, some organizations may improve the efficiency of one's social capital investment efforts by establishing a clearly stated set of values to which all of its members subscribe. Then, because all members know they hold similar values, they all have some social capital with each other because they are members of the same organization even if they are not personally acquainted.

Finally, it appears that freedom of action is an important factor in social capital formation. Multiple studies have shown that worker productivity increases when individuals are given greater freedom of decision making. When greater freedom of decision making is granted to those within an organization, those given increased responsibility and freedom often respond with increased loyalty and greater productivity.

Disinvestments in Social Capital

Disinvestment in social capital between two persons likely occurs when they participate in competitive activities, sometimes called zero sum games. In competitive activities, the goal(s) of one person cannot be achieved unless the goal(s) of the other person is (are) frustrated. Persons participating in competitive activities often develop antipathy because they view each other as threats to their own success. Activities likely to have competitive goals include athletic events, elections, divorces, estate settlements, assignment of contracts, litigation and wars. Other examples include quarantines, embargoes, strikes, contests for budget shares, promotions, employment, and market shares.

Emphasizing competition between groups can sometimes increase social capital within one group. For example, ethnic and religious conflicts in Bosnia, Rwanda, Afghanistan, and Northern Ireland resulted from focusing on competitive differences between groups. Competition between political candidates has also produced distasteful disinvestments in social capital as opposing candidates extol each other's weaknesses. In these efforts campaign staffs often reveal information that shows the opposing candidate has acted in ways that conflict with the voters' best interests. Another example of using competition to build social capital are propaganda campaigns of countries especially during national emergencies including wars. Most often these campaigns emphasize the unpopular traits of the enemy.

Competitive activities not only have the tendency to reduce existing levels of social capital between groups or people, but they may also create antipathy based social capital. A disadvantage of antipathy based social capital is that it may produce perverse economic behavior. The perverse behavior produced by antipathy based social capital is the willingness of an economic agent *i* to reduce the well-being of economic agent *j* even if it means reducing his/her own well-being.

Developing social capital within a group by creating antipathy between groups is a common approach for building social capital in business and politics. One reason the formation of social capital through competitive means is so popular is because of the power of antipathy. For example, in the used car sale study reported earlier, positive social capital resulted in a $420 discount while negative social capital resulted in a $697 premium. The negative premium was 166% of the positive discount.

Finally, disinvestment in social capital occurs when force is used to compel compliance. The force used to compel compliance may include litigation, threats of violence, deception, or physical force. One remarkable quality of the antipathy based social capital that results from the use of force is its longevity. For example, the antipathy that exists between Protestants and Catholics in Northern Ireland and between Serbians and Croatians originated in conflicts involving force over hundreds of years ago.

V. What are Externalities?[4]

In the discussion that follows, we intend to show that social capital rich networks have economic advantages not available to networks that lack social capital. One important benefit enjoyed by a social capital rich network is that they internalize many economic consequences of their actions that would otherwise be treated as externalities. Internalizing externalities improves the terms of trade for those who enjoy high levels of social capital.

An externality is created when one person's action alters the well-being of another person without that person's consent or agreement. An action that increases (reduces) the well-being of another person is said to be a positive (negative) externality.

Externalities can be described in two ways. First, an externality is a by-product of a production process. For example, there are intended pork production and unintended odor and animal waste production. Second, an externality is an input in the

production process. For example, the air that carries the odors and the water and other resources required to dispose of animal wastes are inputs into the pork production process.

If externalities are viewed as inputs in the production process, a view adopted in this report, the critical issue is who owns these inputs? Resource owners can use them as inputs in the production process as they want, even if the resources are scarce and others want them for alternative uses. So the pork producer uses the air to carry away odors. The residents who cannot claim ownership to the air desire the air without the odor for breathing but because they cannot claim exclusive ownership, they cannot restrict the use of air in pork production. Residents near the pork producers may bid away the use of the resource either through purchase or by establishing legal claims. Yet often, the new residence owners may be many and no one or few can alone offer sufficient bids to the pork producer to induce him or her to alter the use of the inputs.

The production of externalities is related to social capital in at least two ways. First, as those who lack ownership of resources increase their social capital with the resource owners, production plans and terms of trade are altered. Because of the increased social capital, owners of resources that may be used in ways that produce (positive negative) externalities may defer their use of the limited resource to others. Alternatively, caring owners may use their resources less intensively and by so doing reduce the externalities for others.

The second consequence of social capital on the creation of externalities is related to property rights. Ownership rests on a consensus of legitimacy. The willing acceptance of another's right to the opportunities of ownership requires some minimal threshold of respect, if not care, for the owner. A despised owner is an insecure owner (Schmid). Expenditures to secure ownership against those who contest or deny ownership range from payments to police, guerrilla groups, lawyers, and armies. As social capital increases, expenditures required to secure ownership rights decrease and can be used more productively. It may be the case that the most serious impediment to economic development is the high cost of enforcing property rights that divert resources from the production of goods and services.

Consider some examples of economic actions that create externalities. Residents pay taxes to support public education even when they have no children in the school system. While there are some direct benefits to childless voters from living in a community with better educated children, many would describe the basis of their school support as their interest in the well-being of the community's children. Citizens vote for bonds that provide for themselves fire and police protection. However, not all community members pay the same for the nearly identical protection they all enjoy. In these examples, citizens are extending resource ownership rights to other citizens who may contribute differently to the creation of the resource.

Citizens who obey the law without compulsion reduce law enforcement costs which lower taxes for them and the entire community. Most large cities have mass transportation systems that are only partially funded by those who directly use the system. The remaining funds supporting the transportation system are provided by taxpayers no matter their use of the transportation system. Public radio provides services to listeners no matter their donations to the radio station. Those who contribute to public radio create positive externalities for those who also listen to public radio and do not contribute funds for its support.

Businesses may agree to construct a mall knowing that locating next to each other lowers transaction costs for all those who shop at the mall. A customer may enter the mall for a particular purchase but while in the mall shop at other stores because of their convenient location. So, in a way, businesses create externalities for each other by bringing customers to the mall. Besides lowering transaction costs for customers by placing businesses together in a mall, the businesses often reduce the overhead costs and some variable costs for each other. Cleaning, parking, protecting, and advertising costs are shared by the businesses in the mall and are less than if each store on its own acquired the same services.

Examples of negative externalities abound as do positive ones. Often, negative externalities involve the production of a profitable product for the producer that diverts an input from an alternative use wanted by a different group. The producer and the consumer may both benefit from the product sold and consumed. However, others not involved in the production or consumption of the desired product are often

adversely affected by having to forego their preferred use of the input. Resources often sacrificed in the production of negative externalities are clean air to the production of smoke, serenity to the production of noise, passable roads to traffic congestions, clean water to polluted water that carries away wastes, and healthy soils to soils polluted with toxic wastes.

Crime is an unlawful interference with the rights of resource ownership. Thus, if the rights of ownership are considered an input into the production process, denying an owner the use of his/her resources by means of a criminal act is the creation of an externality. The criminal may realize an economic benefit from his crime at the expense of the victim who loses his property rights. Nevertheless, the entire community suffers an externality as a result of the crime. The community must now spend more on crime prevention and pass more restrictive laws that limit the activities of its citizens. Finally, crimes impose negative externalities on the community in the form of a lost sense of trust and security.

Clearly, the list of positive and negative externalities could be expanded. Indeed, it may be more difficult to identify activities without external effects than to identify activities with only internal effects. The destruction of rain forests in Brazil, monetary policies carried out in Mexico, and ethnic conflicts in Rwanda may once have had little effect on the U.S. economy, but no longer, as the world becomes increasingly economically interdependent.

Recognition of externalities and their importance leads us to the question: how does social capital affect the production of externalities? We will now explore the connection between social capital, the creation of negative and positive externalities, and household income distributions.

VI. Social Capital, Externalities, and Income Distributions

Having considered how social capital internalizes externalities and changes the terms of trade, we now explore the connection between social capital, externalities, and income distributions.

Consider an economy consisting of two economic agents i and j. Assume that agent i earns more income than agent j. Also assume in this hypothetical economy that agents i and j are engaged in economic activities that produce externalities. Then, as j's social capital increases, externalities are internalized with the following effect on the distribution of income (see Appendix A).

> *If agent j's social capital available from agent i increases, then the combined incomes of agents i and j will increase and the difference in their incomes will decrease.*

Four Externality Models

The importance of the conclusion above relating changes in social capital to the level and disparity of incomes can be shown using four different externality models. The four externality models include: (1) High Exclusion Cost Goods Model; (2) Joint Production Model; (3) Goods Owned in Common Model; and (4) The Ubiquitous Externality Model.

High exclusion cost goods model. A high exclusion cost good is one that allows agents to extract services from goods independent of the agent's contributions to the creation of these goods. High exclusion cost goods exist because of the cost of "fences" or the cost of denying access to the good to those who have not paid for its production. Examples of high exclusion cost goods include: street lights, radio programs, dams providing downstream flood protection, extensive parks with many points of entry, water sanitation plants, and neighborhood police protection. The income distribution conclusion described earlier implies that investments in the high exclusion cost goods by agent i will increase as j's social capital increases. Because of i's increased investment in high exclusion cost goods, the combined incomes of agents i and j will increase and the differences in their income will decrease.[5]

Joint production model. A joint production model is one in which production depends on inputs supplied by more than one economic agent.

Economic agents often engage in the production of both individual and jointly produced goods. For example, many vegetable farmers produce their crops individually but join with others to transport, store, and market their produce. The income distribution

conclusion implies that production of jointly produced goods will increase as *j*'s social capital with *i* increases. Because of increased production of jointly produced goods, the combined incomes of agents *i* and *j* will increase and the differences in their income will decrease.[6]

Goods owned in common model. A good owned in common is one for which several agents have service extraction rights. Goods owned in common are distinguished by their marginal cost of service extraction that depends on the total services extracted. Examples of goods owned in common include wildlife populations, public lands used for grazing, fishing waters, public parks, and publicly owned roads. The income distribution conclusion implies that agent *i*'s service extraction and exploitation of the good owned in common will decrease as *j*'s social capital with *i* increases. Because of *i*'s decreased use of the good owned in common, the combined incomes of agents *i* and *j* will increase and the differences in their income will decrease.[7]

The ubiquitous externality model. Production often involves the use of inputs that have incompatible uses. Agent *i* may use inputs to increase for his profit but in the process preclude their use by agent *j*. For example, inputs necessary for pork production include land, buildings, feed, and a place to put the waste. However, the water, air, and land used to handle the waste may be desired by the neighbors for other purposes. The income distribution conclusion implies that agent *i*'s use of resources with incompatible uses by agent *j* will decrease as *j*'s social capita with *i* increases. Because of *i*'s decreased use of resources with incompatible uses, the combined incomes of agents *i* and *j* will increase and the differences in their income will decrease.[8]

Externalities and Income Transfers

So far the linkages between social capital, externalities, and the income distribution of agents *i* and *j* have been described in production models. In many business arrangements, this characterization of income redistribution possibilities may be accurate. However, in most advanced economies, there exist income redistribution possibilities besides production arrangements. One means of redistribution is an outright transfer. Whether the transfer is voluntary or involuntary influences in different ways an agent's production decisions and the resulting externalities.

Appendix B deduces an important conclusion regarding income transfers, social capital, and differences in income. The conclusion deduced is that:

> *If agent i because of his superior income position relative to agent j is forced to transfer income to agent j, then agent i will reduce the production of positive externalities and increase the production of negative externalities.*

The implication is that externally imposed income transfers will be offset to some degree by production decisions with external consequences.[9]

Another conclusion deduced in Appendix B is that:

> *If the income transfers are voluntary and agent i chooses an amount of his income to transfer to agent j that maximizes his own utility, then transfers to agent j will increase with increases in agent j's social capital.*

These conclusions about income transfers and social capital have some important implications including the following. Externally imposed transfers intended to reduce income disparities may have their effects canceled by agent's voluntary production and investment responses. These offsetting income distribution effects should serve warnings to social planners who believe income inequities can be eliminated with involuntary transfers. On the other hand, awareness of social capital and its usefulness in reducing income disparities may provide policy makers an important new approach for reducing income disparities. The new approach is to design programs to increase social capital.

Measures of Income Disparity

The hypotheses deduced earlier in this paper involve two dimensions of the distribution of income. These two dimensions of income distributions are the average level of income measured by the mean. The standard deviation and coefficient of variation are used as average measures of the dispersion of income. Both the mean and the standard deviation are subject to scaling differences in the cost of living. This scaling difference, if linear, can be removed from the standard deviation by dividing it by the mean, creating the coefficient of variation. Nevertheless, dividing the standard deviation by the mean to obtain an average measure of dispersion changes the units of dispersion

from dollars to percentages. The standard deviation measures the average level of household dispersion income in dollars. The coefficient of variation measures the average dispersion of household income as a percentage of the mean.

If the so-called Kuznets' law holds empirically, we should expect to find the standard deviations of household incomes first increasing and then decreasing with increases in mean income. Even if means and standard deviations of incomes are related in the way just described, this does not imply that means and coefficients of variation are related in the same way. Suppose that means and standard deviations of household incomes are positively related. Suppose also that mean incomes are increasing faster than standard deviations of incomes are increasing. If mean incomes are increasing faster than standard deviations of income, then an inverse relationship will exist between means and coefficients of variation although a positive relationship exists between the mean and standard deviation of income. Thus, the relationship between level and disparity of income may depend on the choice of the disparity of income measure used.

VII. Social Capital, Specialization and Trade, and Income Distributions

To learn more about the relationship between changes in social capital and changes in the level and dispersion of income, consider income distributions for n individuals or firms instead of two firms or individuals i and j used in the earlier deductions. In an earlier section, it was pointed out that trades are likely to increase with increases in social capital. Trading, of course, has the desirable economic outcome of permitting economic agents to specialize in production. One fundamental tenet of economics of which there is a virtual consensus is that specialization increases productivity. The famous example of this point is Adam Smith's observation that a pin maker working alone could barely produce a pin a day. But, 10 pin makers working together and specializing in different parts of the pin production process could produce on average 10,000 pins daily. The advantage of specialization is that one's ability to perform a task is often improved through repetition. Second, specialization allows one to participate in economic activities for which the agent is best suited. But specialization cannot occur without trading since specialization means giving up production of desired goods. Thus, trading and specializations are linked in any economic system.

Increases in social capital increase the incentives to specialize and trade by internalizing the benefits of trade received by one's trading partner. Moreover, since social capital is most likely to develop between family and friends, among these are most likely to develop trading relationships. As high levels in social capital increase the size of the trading group, additional opportunities for specialization and trade are created. Then, with increases in trades and specialization, the average productivity of group members increases (one pin versus 10,000 pins). The final result of increased social capital with a larger size of the group is that the average level of income increases.

Trading Opportunities and the Distribution of Income

Recognizing that social capital influences trading patterns, we next consider how changes in social capital may change the distribution of income. To begin, suppose the world is organized by countries (firms or households) and that each country produces one unique product for export (trade). Next, suppose that free trade exists among all N countries allowing $T_0=N(N-1)/2$ pairs of trading arrangements to develop. As a result, each country would benefit from the productive skill of the other N-1 countries and enjoy the opportunity to consume some of their exports. Finally, we might also assume that under conditions of perfect social capital, total income would be evenly distributed among the N countries.

Next, suppose that the world of countries (firms or households) is divided into two groups of equal size. Assume also that near-perfect social capital exists within the two groups of countries but that antipathy exists between the two groups. Because of antipathy, it is assumed that trading is impeded between countries in the two different groups. In a world divided into two groups (one division), the number of trades is reduced to T_1. Furthermore, T_1 as a portion of trades that occurred before the division, T_0, is equal to:

$$\lim_{N \to \infty} \frac{T_1}{T_0} = \frac{\frac{1}{2} - \frac{1}{N}}{1 - \frac{1}{N}} \approx \frac{1}{2} \qquad (1)$$

The implication of equation (1) follows. As a result of one division of countries in the world, the number of trades that occur is reduced by approximately 50%. This implies that instead of having access to the resources of all *(N-1)* countries, now only *(N/2-1)* countries are available for trade.

It would be quite easy to calculate the reductions in trade that result when additional divisions occur between countries. These are described in Table 1. What is most significant is what happens when more complicated goods are produced. One division reduced trades for simple goods requiring only one trade and two inputs to 50% of the original level of trades. But, for complicated goods requiring 10 inputs and 9 trades, a single division reduces trades to only 10% of the original level of trades (see column 10 and line 2 of Table 1).

The results in Table 1 also have implications for consumption activities. More complicated goods require more complicated exchanges for consumers. Complicated consumer goods such as cars require the consumption of not only car transportation services, but repair services, insurance services, parking services, fueling services, and parts services. Likewise, consumption of health services is now provided by a wide variety of vendors including services provided by insurance companies, hospitals, ambulance services, medical specialists, food specialists, and services available from a wide range of therapists. Social capital appears to play a significant role in facilitating trades not only for production but for consumption as well.

From equation (1) and Table 1, some implications may be deduced about divisions and the distribution of household income. First, we might reason that as the size of the group enjoying near-perfect social capital increases, so does the mean income of the group. The reason that we expect mean incomes to increase as the size of the group enjoying near-perfect social capital increases is because of the increasing opportunities for specialization and trade.

TABLE 1: Ratios of Trades Conducted After Divisions to Trades Conducted Before Divisions

# of Divisions	*Number of Trades Required Per Goods Produced*								
	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
	Percentage								
0	100	100	100	100	100	100	100	100	100
1	50	33	25	20	17	14	13	11	**10**
2	25	11	6	4	3	2	2	1	1
3	13	4	2	0	0	0	0	0	0
4	7	1	0	0	0	0	0	0	0
5	3	0	0	0	0	0	0	0	0
6	2	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0

Source: Estimated by the authors

The lesson from Table 1 follows. Increased social capital encourages trade and permits greater specialization. Increased specialization allows for a greater diversity of goods to be produced and increases the economic rewards available for distribution to market participants. Finally, mutually beneficial trades likely lead to increased levels of social capital that increase total incomes and reduce the dispersion of incomes between countries (firms and households).

A second reason mean income increases with group size is that within the group, what otherwise might be considered externalities are now internalized and the results deduced in Appendix A apply. These results imply that for cases of externality such as four models already discussed, that mean income will increase with an increase in the size of the group and the dispersion of income will decrease.

Whether or not the mean income increases linearly or increases at a decreasing (increasing) rate as the size of the socially close group increases is an empirical question. Opportunities for trade within the group increase at an increasing rate as the size of the group increases. On the other hand, as the size of the group increases, the demand for bonding activities may also increase at an increasing rate. In addition, the cost of maintaining social capital as the group size increases may effectively limit the size of the group unless efficient means of investing in social capital are introduced. One means for efficient social capital investments already mentioned was to establish organization based on commonly accepted values.

The discussion about group size has emphasized the advantages of trade. What makes the discussion relevant is an important empirical fact. In 1945 when the United Nations was founded, the world was organized into 51 countries. This number increased to 100 in 1960. By the year 1994, the number of countries had increased to 192. Since 1994, the number of countries has continued to increase (Bradshaw and Wallace). If increasing the number of countries results in trade restrictions between those who were formerly members of the same country, then we can expect the consequences just described; mainly, less specialization and reduced income for each group member.

Social Capital, Specialization and Trade, and Kuznets' Law

Suppose that there exists an economy of N countries (persons or firms) all perfect and symmetrically endowed with social capital so that each values each other's income the same as his or her own. Furthermore assume that each member of the group earns $y(N)$ income which increases with increases in N. This arrangement represents the ideal and should result in the highest level of income equally distributed.

Next, suppose that a dispute arises that divides N persons into two groups. Assume that the division destroys the social capital between the two groups but within the two groups, social capital remains perfect and symmetrically distributed. Under this new arrangement, one might make the argument that incomes remain equal within groups since perfect and symmetrical social capital exists. Furthermore, if the average income levels of the two groups are equal, then income must be evenly distributed for all N persons, countries, firms, or households just as in the first case. What is different from the first case is that the opportunities for specialization and trade have been reduced. In addition, the extent to which externalities are internalized is also reduced so that the average level of income has been reduced from $y(N)$ to $y(N/2)$.

Suppose that the means and the standard deviations associated with the household income distributions before and after the divisions were plotted. The two distributions represented by their means and standard deviations would be represented as two points on the vertical scale that measures the mean of household incomes for zero variations in household income. The point representing the income distribution before the division is described as point B in Figure 1. The point representing the income distribution after the division is described as point A in Figure 1. The two distributions are distinguished only by differences in their means, providing one example of how a decrease in social capital changes the mean but may leave the disparity of incomes measured by the standard deviation unchanged.

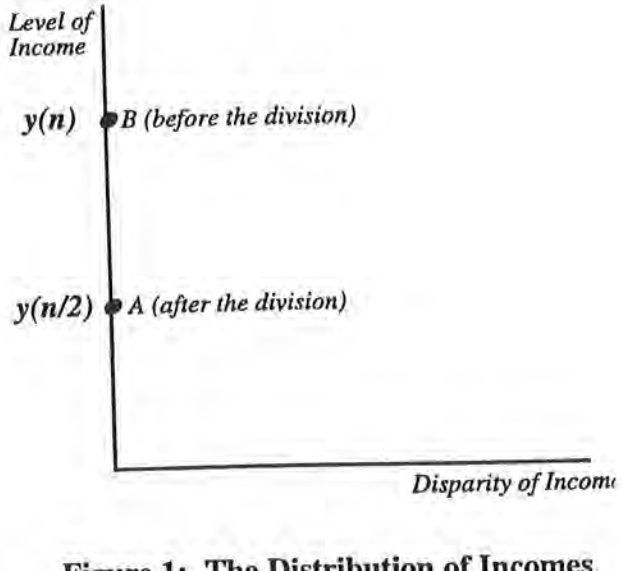

Figure 1: The Distribution of Incomes Before and After a Division

Next, consider the consequences on the distribution of incomes between the two groups if membership in the two groups were not evenly divided and the size of the group was the sole determinant of the level of income. Consider first changes in the overall mean level of incomes earned in the two groups as membership in the first group, n, grows from zero to N while membership in the second group, $(N-n)$, decreases from N to zero. With $n=0$, all N members of the population earn the highest level of income possible because the size of the second group is at its maximum. Nevertheless, as n increases to $n=N/2$, the overall mean of incomes earned by members of the two groups decreases to $y\ (n/2)$.

The decrease in average income as n grows to $N/2$ occurs because as members of the larger group join the smaller group, they are exchanging a higher income for a lower income. Of course, this reduction in income must be compensated by increases in social capital if the membership realignment is to occur voluntarily. Moreover, all members of the larger group suffer a loss in income while all members of the smaller group earn a higher income. Nevertheless, for $n<N/2$ the number of persons suffering a reduction in income is greater than the number of persons enjoying an increase in income. As n increases past $N/2$ in size, the mean income increases to its original value obtained when $n=N$. Thus, the mean income produces a "U" shape pattern as n increases. The "U" pattern of mean income in response to changes in n is described in Figure 2.

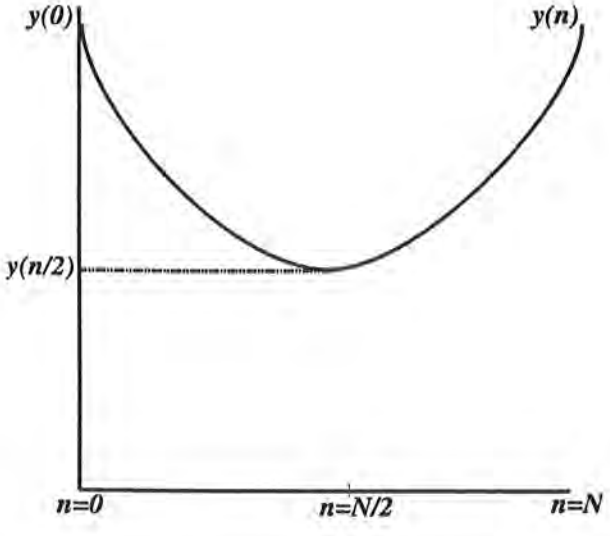

Figure 2: The Effect on Average Income of Changing Group Sizes

The effect of an increase in n on the dispersion of income is more complicated than the effect of an increase in n on mean incomes. Maintaining our assumption that the level of income depends on the size of one's group, then the disparity of income is zero for $n=0$, $n=N$, and $n=N/2$. In the first two cases, all N members of the population belong to one or the other of the two groups. For the third case, all N members of the population belong to groups of equal size and therefore earn equal incomes. Thus, the disparity pattern, for example the standard deviation, first increases and then decreases toward zero as n approaches $N/2$. Then, as n increases in size beyond $N/2$, the pattern is repeated. The two humps in the relationship between income disparity and increases in n are described in Figure 3.

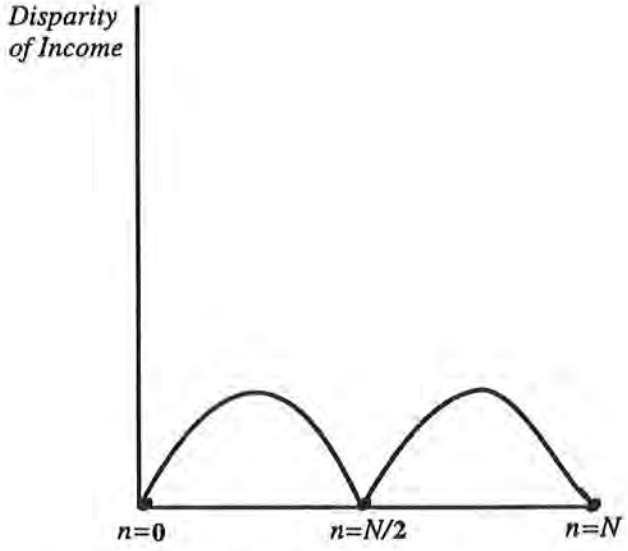

Figure 3: The Effect of Group Size on Disparity of Income

Income distributions measures described in terms of their means and disparity of incomes for increases in n are described in Figure 4 by combining Figures 2 and 3. Note that the dispersion of income first increases and then decreases with increasing mean levels of income reminiscent of the earlier described Kuznets' law.

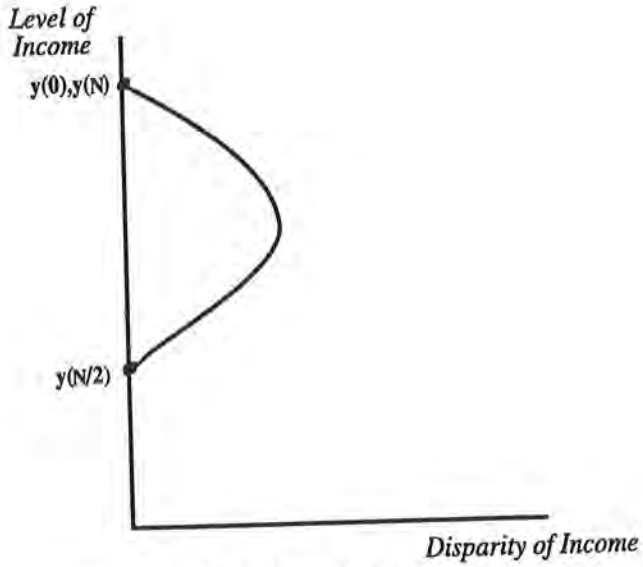

Figure 4: The Result of Group Size on Average Income and Disparity of Income

VIII. Distribution of Income and Social Capital

The results of the previous section can be generalized in another way if we allow for groups of different sizes while retaining the restriction that the overall population is N and that incomes in each group depend on the number of members. (We continue to assume that income within groups is equally divided). To describe a particular distribution of income, let $y(n)$ represent the income earned by every member of a group of size n. Moreover, let $f(n)$ represent the number of groups of size n that exist in the current distribution. Of course, the restriction must be imposed that N equals the sum over all possible n values of $nf(n)$. The distribution of the population according to their respective group size is described by the function:

$$g(n) = \frac{nf(n)}{N} \qquad (2)$$

which if summed over all possible values of n equals one.

The importance of the function $g(n)$ is that it has all the properties of a probability distribution. Moreover, by treating $g(n)$ as a probability density function we can find the mean income and standard deviation of the population for each income distribution observed.

Describing income distributions in the language of probability density functions allows almost unlimited possibilities of patterns of income distributions to be created by simply changing the number and size of groups. For example, one transformation on probability distributions is to take probability from the center of the distribution and shift it to the tails of the distribution. This change can be done in such a way that the mean of the distribution is left unchanged while the standard deviation of the distribution is increased. In terms of our income distribution, these mean-preserving shifts in population would result in a horizontal mean-standard deviation frontier of household incomes (see Figure 5).

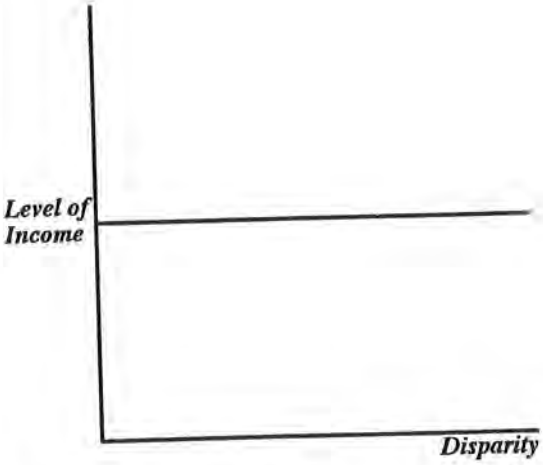

Figure 5: Level and Disparity of Income Relationship Created by Mean-Preserving Shifts of the Distribution Function $g(n)$

In our economies of social capital rich groups that restrict their trading activities to members of their group, the mean income of the population is described by the function:

$$\bar{y} = \sum_{n=1}^{\infty} y(n)g(n) \qquad (3$$

while the standard deviation of the income distribu tions equals:

$$\sigma = [\sum_{n=1}^{\infty} (y(n)-\bar{y})^2 \, g(n)]^{1/2} \qquad (4$$

Changes in Social Capital and Income Distribution

The question we consider next is: does there exist a correspondence between changes in social capital and income distributions? To answer this question, let k represent the social capital one individual has available to him from any member of his/her group. Furthermore, describe this person's total stock of social capital from the $(n\text{-}1)$ members of his group as $(n\text{-}1)k$. For all n members of the group of size n, the individual's total social capital is $n(n\text{-}1)k$. Clearly, the stock of social capital within the group and for any individual member of the group increases with n just as the income per member $y(n)$ increases. Thus, there exists a monotonic relationship between social capital per member of a group and the income level per member of the group if average income increases as group size increases. And, for two groups, mean social capital bears the same relationship to n as does mean income described in Figure 2.

We calculate the mean level of social capital for the completely general case by multiplying $(n\text{-}1)k$ by distribution function $g(n)$ that measures the percentage of the population that belongs to a group of size n. Thus, the mean social capital for any particular distribution is:

$$\bar{k} = \sum_{n=1}^{\infty} (n\text{-}1)kg(n) \qquad (5)$$

Under the assumption that the level of income depends on the group size and that perfect and symmetric social capital exists within each group, increases in social capital must be highly correlated with increases in mean income levels. We might define the relationship between $y(n)$ to $(n\text{-}1)k$ using the functional relationship:

$$h(n) = (n\text{-}1)k \qquad (6)$$

so that $h(n) = k$ and $y(n) > 0$.

The next question of interest is the correlation between the standard deviation calculation for $y(n)$ and $h(n)$. The question is somewhat complicated since a mean-preserving spread in $g(n)$ that preserves the mean of $y(n)$ may not preserve the mean of $h(n)$. However, any spread in the probability distribution will increase the standard deviation of both income and social capital. Thus, we expect not only a high correlation between means of income and social capital but also between standard deviations of incomes and social capital.

Measuring Social Capital

Two methods have been used to describe the potential effects of social capital on income distribution. The first method considered the production function approach for two firms. The details of the deduction are described in Appendix A. This approach emphasized the role of social capital on externalities. The second method for deducing social capital consequences on distribution of income relied on a trade framework in which social capital organized trade within social capital rich groups and prevented it between groups lacking social capital. In this latter framework, it was demonstrated that almost any pattern of income distribution changes can be described by changing the composition and number of trading groups. The two methods are mutually reinforcing.

Summarizing the Effects of Social Capital on Income Distributions

So far, the effect of changes in social capital on income distributions has been deduced using two different approaches. The first approach used production models to show how social capital internalized externalities and increased the level and reduced the disparity of incomes. The second approach emphasized how social capital organized trade among social capital rich groups. Moreover, since group size determined opportunities for trade and specialization and the extent to which externalities were internalized, income per group member was assumed to increase with group size.

Finally, the report showed how the language of statistics could be used to describe income distribution measures. In the trade model, it was demonstrated that almost any pattern of income distribution can be derived by changing the composition and number of social capital rich trading groups.

Measuring the Connection Between Social Capital and Income Distributions

We now consider methods to test empirically whether or not increases in social capital increase the level and reduce the disparity of income between households. Testing for the effect of increased social capital on the level and disparity in household income requires that we make inferences that depend on communities instead of the two-member economy for which theoretical results were derived in Appendix A. Therefore, developing a measure of a community's social capital is necessary.

Consider first the social capital resource available to person j. The social capital person j has available from person i provides potential terms of trade advantages. These potential trade advantages we call j's stock of social capital. Person j's total social capital resource or stock of social capital summed over all persons i is written as:

$$S_j = \sum_{i=1}^{n} k_{ij} \tag{7}$$

The size of j's social capital resource deserves some discussion. First, it depends on the number of individuals n with whom j has a relationship. Second, it depends on the amount of the social capital j has with each individual. One might predict that, other things being equal, an inverse relationship exists between average levels of social capital represented by social capital coefficients and the size of the group with whom j interacts. In smaller communities, the average level of social capital may be larger than the average level of social capital in a large city. This result is expected because in a large city one interacts less frequently with any one individual than might be the case in a small city.

The challenge of social capital research is to describe the social capital resource base in such a way that it permits analysis. The approach we follow is to describe social capital resources in a community using the language of statistics. To this end, consider a community of individuals j=1, ..., n. One way to characterize the distribution of social capital among a community of n members is to denote the distribution of social capital in the same way one denotes a cumulative probability distribution. Thus, we let $G(S_j)$ be a cumulative distribution function that describes the percentage of the population with social capital equal to or less than S_j. Corresponding to the cumulative distribution of S_j is the cumulative distribution of household income Y_j denoted $F(Y_j)$. For both the distribution of social capital and household income one can calculate summary statistics of expected values, standard deviations, and coefficients of variation (standard deviations divided by their respective expected values).

Denote the expected values of S_j and Y_j as μ_S and μ_Y, respectively. Then, denote the standard deviations of S_j and Y_j as σ_s and σ_y, respectively. The important question is: do increases in the expected value and standard deviation of social capital have any predictable effects on the expected value and standard deviation of household income? Our maintained hypotheses based on our earlier deductions are the following:

$$H_0 : \frac{d\mu_y}{d\mu_s} > 0 \tag{8}$$

and:

$$H_0 : \frac{d\sigma_y}{d\sigma_s} > 0 \tag{9}$$

The hypothesis reflected in equation (8) follows directly from the deduction in Appendix A. Increasing social capital of either agent i or j will increase the total and average income of a two-person economy with externalities. If we assume that opportunities for exploitation require agents i and j to provide equal levels of social capital, then equation (9) follows from the deductions in Appendix A. Only when i's social capital increases relative to j's and j earns less income than does i, is the conclusion in equation (9) possibly violated. Finally, we are interested in the effects of an increase in the level of social capital on the coefficient of variation.

We would like to test directly the relationships between social capital and household income hypothesized in equations (8) and (9). However, we are not able to observe social capital directly. Instead, what

we observe are indicator variables that are expected to be highly correlated with social capital. These indicator variables can then be tested to see how they correlate with the expected value, standard deviation, and coefficient of variation of household income.

IX. Indicator Variables and Household Income Distributions

Households Headed by Single Parents with Children and Kuznets' Law

Two results derived so far deserve careful attention. The first result is that among social capital rich units, externalities are internalized. The result is that average incomes are likely to be increased and differences in income reduced among members of the socially close unit. The second result that deserves careful attention is that the size of a social capital rich unit determines trading and specialization opportunities. As the size of the social capital rich unit is decreased through division or attrition, opportunities for trade and specialization are reduced. Moreover, since one's income level is related to one's opportunity to specialize and trade and the extent to which externalities are internalized, we expect the income level of social capital rich units to increase with the size of the unit, an assumption employed earlier.

The social unit most likely to experience near-perfect social capital or the unit most likely to internalize externalities is the family or household. Supporting evidence for this conclusion is the dominance of family businesses. However, the evidence presented in this paper is that not all households enjoy the same level of social capital.

According to the U.S. Bureau of the Census, median income for married-couple families with children less that 18 years of age was $22,568 in 1980 and $40,693 in 1989. In contrast, median income for households headed by a single female with own children less than 18 was $8,002 in 1980 and $12,485 in 1989. The evidence is that economically, households headed by a single female with own children are economically disadvantaged compared with households headed by a married couple with own children.

If social capital available in single-parent households is less than that available in two-parent households, then the trends in Table 2 should be of some interest. In 1970, single-parent families with children represented 11% of all families with children. By 1980, 19.5% of the families with children were headed by a single-parent and by 1990 the percentage had reached 24%.

To describe the effects on the level and disparity of household incomes associated with increases in households headed by single parents with children, consider the following argument. Suppose there exists an economy with households that all enjoy perfect and symmetric social capital within the household. Also assume that the households enjoy a social capital resource with persons outside the household unit that depended on whether one or two parents were present as well as the size of the household and the age of the members of the household.

Next, we assume that the number of households headed by a single parent and the number of households headed by married parents equals m. Finally, allow the population of potential heads of households to be $P=2m+s$. Furthermore, assuming that because of the size and the age of household members, and the presence of one or two parents in the household, married households are assumed to have more social capital and to have higher levels of income than households headed by single females with children. Thus, the income of married households $y(m)$ is assumed to exceed the income of households headed by single-parent (primarily single female) households $y(s)$. The average household income based on the assumptions and symbols just adopted equals:

$$\bar{y} = \frac{m\,y(m) + s\,y(s)}{m+s}$$

It should be apparent that if the number of households headed by single parents with children increases, the average income of all households decreases. This result occurs because households are moving from a higher to a lower earning category. One might also expect the total number of households to increase as well since single parents are now sharing the children. The inverse relationship between the average income as the number of single-parent households is described in Figure 6.

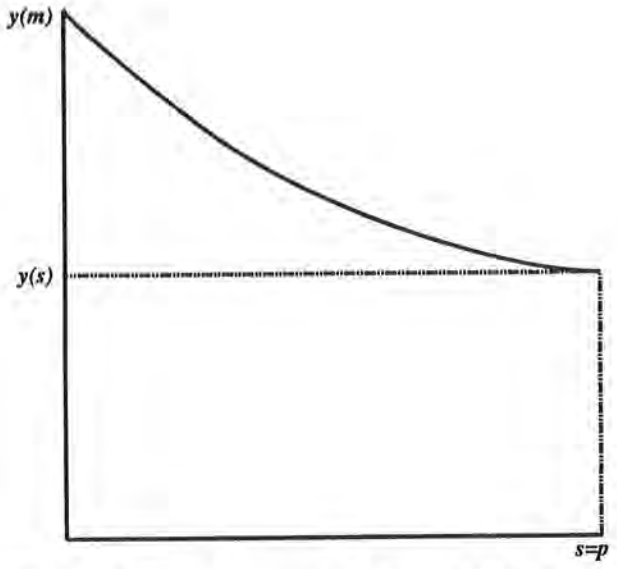

Figure 6: The Inverse Relationship Between the Number of Households Headed by Single Parents with Children and Average Household Income

Next consider the consequences on the disparity of incomes among households as the number of households headed by a single parent increase. If $s=0$, then all households would earn $y(m)$ level of income and the disparity of income among households would be zero. Furthermore, if all households were headed by a single parent, $s=P$, then all households would earn $y(s)$ and again the disparity of income would be zero although the income level would be reduced from $y(m)$ to $y(s)$. These two possible income distributions are described in Figure 7.

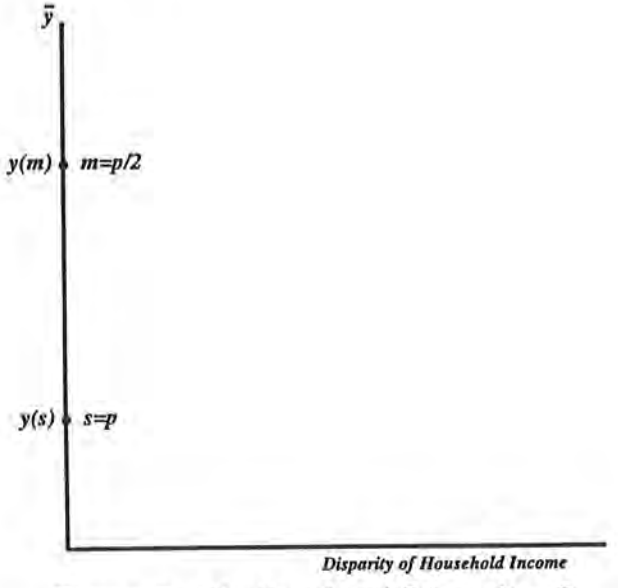

Figure 7: The Level and Disparity of Household Incomes if All Households Were Headed by Either a Single or Two-Parent Family

As m increases from zero to $P/2$, the disparity of income would first increase from zero and after some point would decrease until disparity of income was again zero. This relationship between increases in m and disparity of income is described in Figure 8.

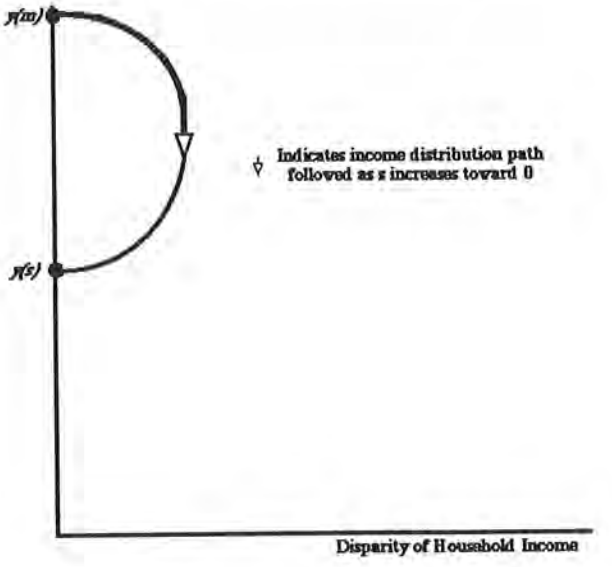

Figure 8: The Effect of Increases in m on the Disparity of Household Incomes

Finally, if we were to combine the relationships described in Figures 6, 7, and 8, the relationship would again be that described by Kuznets' law and is depicted in Figure 4. In addition, if the relationships described in Figure 4 are correct, then the level of income and disparity of income may not be significantly correlated. On the other hand, if the relationship were limited to points in Figure 4 to points where the relationship between the level of income and the measure of disparity were inverse, then we would observe a significant correlation.

We expect that current observations corresponding to increases in the percentage of households headed by a single parent are primarily located along the upper portion of the graph in Figure 8. Thus we expect to find an inverse relationship between disparity and level of household incomes.

Indicator Variables

Social capital indicator variables expected to be related to social capital levels include crime rates, infant mortality rates, school dropout rates, poverty rates, labor force participation rates, drug use rates, divorce rates, birth rates from single teens, rates of voluntary giving and community service, and rates of memberships in community organizations including attendance at religious services (Putnam, 1993). In the discussion that follows, these and other related indicator variables are organized into four groups: 1)family integrity, 2)educational achievements, 3)crime, and 4)labor force participation. In addition, we consider the affects of transfer payments on increase distributions.

Family integrity. In her presidential address, Bokemeier writes: "families and households are the critical and strategic social organization through which individuals shape and adapt to social transformations" (Bokemeier, p. 5). We assume families are the primary unit of organization in society and most responsible for the production of social capital.

The U.S. Bureau of Census (1990) defines a family as a domestic group of two or more people united by bonds of blood, adoption, or marriage. A household, in contrast to a family, is defined as a unit of coresidence (Bokemeier, p. 12). In today's North American culture, many different family and household organizations are emerging including blended families that include new spouses, ex-spouses and their parents and partners, children, and step-children, cohabiting households with adults and/or children, and single and unwed parents.

In the empirical section of this paper, we are concerned with a household type that is increasing in importance, the household headed by a single female with children. One could argue that the study should be equally focused on the household headed by a single male with children. But, empirically, the household headed by a single male with children does not appear to be significantly related to variables associated with social capital or distribution of income.

Households headed by a single female with children appear to be disadvantaged by their social capital position. McLanahan and Booth note that those families headed by single women are at a significant disadvantage given the persistent gender gap in wages, low child support payments, and reduced access to social and cultural capital. In addition, two parents have access to the social capital associated with the extended family units of each parent that can be made available to the children. Single-parent families often lack the social capital resources of the estranged spouse's family. For all these reasons, we expect the decline in families headed by two parents to reflect a reduction in social capital per household and hence to adversely affect the income distribution (see Table 2).

Whitehead supports the view that households headed by single parents may be disadvantaged financially and in their efforts to provide social capital to their children. Whitehead writes: "Children in single-parent or step-parent families are more likely than children in intact families to be poor, to drop out of school, to have trouble with the law, to do worse, in short, by most definitions of well-being." (1993)

The reduced social capital resources available to children in single-parent homes do not imply that single parents care less for their children than do married parents. The assumption of reduced social capital means that, in general, single parents simply have less social capital resources to share with their children. Indicator variables selected to measure social capital associated with the family include: percentage of households headed by single females with children, birth rates from single teens, and infant mortality rates.

An important change is occurring in the cause of the formation of households headed by a single parent. A household headed by a single parent with children may arise from divorce, death, or unwed births. The important trend is the increasing importance of unwed births as the cause of households being headed by a single parent with children. The second fact that remains unchanged over time is that predominantly females head single-parent households with children. In 1980, 91.5% of the households headed by a single parent with children under 18 were headed by a female. In 1990, 87.4%, and in 1995, 87% of the households headed by a single parent with children under 18 were headed by a female (see Table 3).

Educational achievements. Some studies support the conclusion that educational attainments are related to the social capital resources available to the students. Coleman and his colleagues pointed out

TABLE 2: Families by Presence of Own Children Under 18: 1970 to Present

(Number in Thousands)

			Families with Children Under 18 One-Parent Families			
Year	*All Families*	*Total Families with Children Under 18*	*Total Single Parent Families with Children Under 18*	*Mother Only*	*Father Only*	*Married Couple Families*
1995	69,305	34,296	9,055	7,615	1,400	25,241
1994	68,490	34,018	8,961	7,647	1,314	25,058
1993	68,144	33,257	8,550	7,226	1,324	24,707
1992	67,173	32,746	8,326	7,043	1,283	24,420
1991	66,322	32,401	8,004	6,823	1,181	24,397
1990	66,090	32,289	7,752	6,599	1,153	24,537
1989	65,837	32,322	7,587	6,519	1,068	24,735
1988	65,133	31,920	7,320	6,273	1,047	24,600
1987	64,491	31,898	7,252	6,297	955	24,646
1986	63,558	31,670	7,040	6,105	935	24,630
1985	62,706	31,112	6,902	6,006	896	24,210
1984	61,997	31,046	6,706	5,907	799	24,340
1983	61,393	30,818	6,455	5,718	737	24,363
1982	61,019	31,012	6,547	5,868	679	24,465
1981	60,309	31,227	6,300	5,634	666	24,927
1980R	59,550	31,022	6,061	5,445	616	24,961
1980	58,426	30,517	5,949	5,340	609	24,568
1979	57,804	30,371	5,857	5,288	569	24,514
1978	57,215	30,369	5,744	5,206	539	24,625
1977	56,710	30,145	5,270	4,784	486	24,875
1976	56,245	30,177	5,067	4,621	446	25,110
1975	55,712	30,057	4,888	4,404	484	25,169
1974	55,053	29,750	4,472	4,081	391	25,278
1973	54,373	29,571	4,181	3,798	386	25,387
1972	53,296	29,445	3,963	3,598	365	25,482
1971	52,227	28,786	3,695	3,365	331	25,091
1970R	51,586	28,812	3,271	2,971	345	25,541
1970	51,237	28,665	3,260	2,925	335	25,406

Source: U.S. Bureau of the Census

TABLE 3: Children Under 18 Years Living with Mother Only, by Marital Status of Mother, 1970 to 1995 (number in thousands)

Year	Total Living With One Parent	Living With Mother Only				
		Total Living With Mother	Marital Status of Mother			
			Divorced	Married Spouse Absent	Widowed	Never Married
1995	18,938	16,477	6,019	3,901	695	5,862
1994	18,590	16,334	5,799	3,838	696	6,000
1993	17,872	15,586	5,687	3,739	649	5,511
1992	17,578	15,396	5,507	3,790	688	5,410
1991	16,624	14,608	5,206	3,583	780	5,040
1990	15,867	13,874	5,118	3,416	975	4,365
1989	15,493	13,700	5,227	3,380	803	4,290
1988	15,329	13,521	5,010	3,371	838	4,302
1987	15,071	13,420	5,325	3,288	821	3,985
1986	14,759	13,180	5,350	3,322	902	3,606
1985	14,635	13,081	5,280	3,367	939	3,496
1984	14,025	12,646	5,167	3,423	925	3,131
1983	14,006	12,739	5,190	3,334	1,004	3,212
1982	13,702	12,512	5,103	3,518	1,123	2,768
1981	12,619	11,416	4,912	3,540	1,158	1,807
1980r	12,466	11,406	4,766	3,610	1,286	1,745
1980	12,162	11,131	4,630	3,519	1,260	1,721
1979	11,529	10,531	4,259	3,487	1,241	1,544
1978	11,711	10,725	4,335	3,509	1,250	1,633
1977	11,311	10,419	4,211	3,618	1,255	1,335
1976	11,121	10,310	4,017	3,797	1,357	1,139
1975	11,243	10,2	3,644	3,857	1,565	1,166
1974	10,489	9,647	3,278	3,789	1,614	966
1973	10,093	9,272	3,103	3,745	1,533	892
1972	9,634	8,838	2,799	3,901	1,506	632
1971	9,478	8,714	2,622	3,866	1,449	773
1970	8,199	7,452	2,296	3,234	1,395	527

NOTE: Data based on the Current Population Survey (CPS) unless otherwise specified.

that social networks, norms, and expectations among community members facilitate and encourage educational achievement in the community. Coleman and his associates also attribute the existence of social networks, norms, and expectations to lowering the dropout rates of students at Catholic schools compared to dropout rates at public and other private schools (Coleman and Hoffer).

Lopez found that social capital plays a significant role in determining whether students enroll in college-bound curriculums or not. Relating social capital to the parents' involvement in the student's high school activities, Lopez concluded that students in the non-college bound curriculums have lower levels of social capital at home than those students in college-bound curriculums. Continuing, Lopez noted that students with lower levels of social capital at home also have lower levels of social capital at school. Both forms of social capital affect student performance in school evaluations.

Indicator variables selected to measure social capital associated with education used in this study include: high school graduation rates and teens not in school.

Crime. Increasing litigation reflects a reduced ability to resolve disputes without engaging the judicial system. In addition, increasing litigation rates suggests increased transaction costs with the tendency to reduce specialization and trade and generally lowering the level of economic activity. Increasing litigation may also reflect a decrease in property rights that are made legitimate by their acceptance by non-owners. The respect of property rights in a community may reflect high levels of social capital. States with high rates of litigation are assumed to reflect low levels of social capital. Finally, the complete breakdown of social capital is reflected by violent deaths, increasingly a problem among youth.

Indicator variables selected to measure (antipathy based) social capital associated with crime include: civil cases per capita and violent deaths of teens.

Labor force participation and poverty. The final category reflective of social capital is the employment network. In a well-functioning and social capital rich community, the skills of workers are employed productively. Moreover, this employment network communicates job opportunities efficiently. In addition, job training opportunities are also communicated. Two separate studies confirm that employment in nearly 75% of the cases is obtained through informal contacts (Granovetter; U.S. Department of Labor). Where social capital enhanced labor networks operate efficiently, it is expected that there will exist high levels of labor force participation. Associated with labor force participation is the economic well-being of children. Thus, at the same time we measure labor force participation, we examine childhood poverty rates.

Indicator variables selected to measure social capital reflected in the labor market include labor force participation rates and childhood poverty rates.

Transfer payments for health purposes. Most state and federal transfer payments are included in household income measures. However, public expenditures for health maintenance are not included in household income measures. It is assumed here that transfer payments for health maintenance are an important reflection of a society's collective social capital and are included as a separate variable.

X. Testing the Relationship Between Indicator Variables and the Level and Disparity of Household Income

Robustness of Results

In strong statistical tests there is a small likelihood that the tests will confirm an incorrect hypothesis. Our efforts to apply this statistical requirement to our study take the following form. We perform the same analysis on two different data sets.[10] The assumption is that there is only a small likelihood that an incorrect hypothesis would be confirmed two times using different data sets. The first data set is organized by states for 1990. The second data set is organized by states for 1980.

Ex ante, we expect strong correlations between indicator variables within each group. Second, we expect to find strong correlations between indicator variables and income distribution measures including mean incomes for households, and especially coefficients of variation of household incomes. Finally, using a statistical procedure to capture the influence of our indicator variables, factor analysis, we intend to determine the extent to which mean incomes for

households and coefficients of variation of incomes for households can be predicted. Last, we expect to find an inverse relationship between mean incomes for households and coefficients of variation of household incomes.

Sources of Data

The primary data sources for this study are from the U.S. Bureau of the Census, Statistical Abstract of the United States, the Economic Report to the President, and other publications. Using Public Use Microdata Sample (PUMS) data, we calculated means and coefficients of variations for household incomes in states for census years 1980 and 1990 (reported for 1979 and 1989, respectively).

Sources of data and values of indicator variables used in this report are included in a supplement to this report. The supplement serves two purposes. The first purpose of the supplement is to provide the data used in this report to other researchers who wish to replicate our results or to perform additional tests using the data of this report. The second purpose of the supplement is to reduce the length of this report. The title of the supplement to this report is: *Data Book: Social Capital and Household Income Distributions.* The *Data Book* was prepared by Marcelo E. Siles and Lindon J. Robison. Throughout the remainder of this study, instead of listing data sources, the reader will be referred to the *Data Book.*

Because of the large number of variables included in this analysis, there is a need to standardize their names. To assist the reader in identifying variables described later on, the acronyms used to describe variables are identified. Each variable's acronym contains a prefix and a suffix. The prefix identifies the variable group to which the variable belongs, the year represented by the data, and the geographic unit of the data. The group designations are F for family, E for education, C for crime, T for transfer payments, and L for labor. If the variable is computed, the variable is identified as Cu. Also included in the prefix are the year designations, either 90 for year 1990 or 80 for year 1980. Thus, the prefix for a variable from the family group representing a state in 1980 would have a prefix F80.

The suffix identifiers for variables used in this study are letters or acronyms used to designate the variable's name. The variables and the identifying acronym in parentheses include: households headed by single females with children (HHSFC), birth rates of single teens (BRST), infant mortality rates (IMR), high school graduation rates (HSGR), percentage of teens not in school (TNIS), litigation rates (LIT), violent death rates among teens (VDT), labor force participation rates (LFPR), and childhood poverty rates (CPR). The computed variables in this study are means of household incomes (M), and coefficients of variations of household incomes (CV). Transfer payment variables are health maintenance expenditures (H), welfare expenditures (W), and education expenditures (E).

Examples of complete variable designations including prefixes and suffixes follow. The variable representing state litigation rates in 1990 is represented as C90/LIT. The mean of household incomes by state in 1980 is described as Cu80/M. State expenditures per student in 1990 in support of public education are represented as T90/E.

XI. Statistical Results for States, 1990

Correlations Between Indicator Variables

Correlations and statistical significance levels between indicator variables for states in 1990 are reported in Table 4. Correlations between indicator variables within groups are bolded and boxed. All of the correlations within variable groups are significant at the .1% level or higher. For variables included in the 1990 family integrity variable group, (F90), the correlation between households headed by single females with children (F90/HHSFC), and the birth rate of single teens (F90/BRST) is 67%. The correlation between F90/HHSFC and infant mortality rates (F90/IMR) is 59%. The correlation between F90/BRST and F90/IMR is 75%.

For variables included in the 1990 education variable group (E90), the correlation between high school graduation rates (E90/HSGR) and teens not in school (E90/TNIS) is -61%.

For variables included in the 1990 crime variable group (C90), the correlation between litigation measured as per capita civil cases (C90/LIT) and violent death rates among teens (C90/VDT) is 44%.

Finally, for variables included in the 1990 labor force participation group (L90), the correlation between labor force participation rates (L90/LFPR) and child poverty rates (L90/CPR) is -.70%.[11]

It is also significant that F90/HHSC is correlated with all of the other indicator variables of the .1% or higher except for the C90/VDT.

To measure the correlations between indicator variables and income distribution measures suggested by equations (8) and (9), requires measures of means and standard deviations of household incomes. Using data from the 1990 U.S. Census, we estimated the means and standard deviations of household income by state.[12] However, the means and standard deviations between states may not be directly comparable if there exist significant differences in the cost of living between states.

To convert income distributions to the same index would require that we calculate cost of living indices for each state. However, a consistent measure of the dispersion of income could be obtained by dividing the unadjusted standard deviation of income by the unadjusted mean income measure. This measure, the coefficient of variation, provides a consistent measure of the average dispersion as a percent of the mean. But the problem remains: if significant differences in the cost of living exist between states, how do we scale the differences?

This study did make an effort to obtain cost of living indices by states and the adjustment is described in the *Data Book*. But we choose to use the unadjusted data because arbitrage, especially between major population centers, was expected to reduce significant differences in the cost of living (see *Data Book* for a discussion of the cost of living index calculated by state). In addition, after adjusting mean data, we were disappointed with the statistical properties of the adjusted mean and used instead unadjusted means.

Having measures of means and coefficients of variations of household incomes by state, we then calculated the correlations between indicator variables and coefficients of variation and means of household incomes. These correlations are reported in Tables C1 and C2, respectively.

The correlation between coefficients of variation calculated by state for 1990 (Cu90/CV) and the indicator variables all have the predicted sign and all are significant. The most significant correlations are between Cu90/CV and L90/CPR (76%), L90/LFPR (-68%), and F90/BRST (54%).

Correlations between the mean of household incomes and the indicator variables are less significant than were the correlations between the indicator variables and the coefficients of variation. These results may suggest that social capital has more to do with income disparity than it does with the level of income. Or it may mean that a proper cost of living index is needed to fully reflect the appropriate values of the data.

Four of the indicator variables were significantly correlated with the mean of household income and all of the four carried expected signs. Significantly correlated with the mean of household incomes in 1990 (Cu90/M) were L90/LFPR (59%), L90/CPR (46%), C90/VDT (-44%), and F90/BRST (-41%). The five indicator variables not significantly correlated with Cu90/M were: F90/HHSFC, F90/IMR, E90/HSGR, E90/TNIS, and C90/LIT.

Factor Analysis

Because of the large number of indicator variables, their influence was summarized using factor analysis.[13] Eighty-one percent of the variance associated with the indicator variables was captured using four factors. The factors are listed in Table C3. The factors are consistent with the family, education, labor, and crime groupings described earlier.

Next, efforts were made to predict differences in means and coefficients of variations in states during 1990 using the four factors described in Table C2 and one income transfer variable. The one income transfer variable used was per person expenditures by states for health. Regression results using the four factors and the one transfer variable to predict coefficients of variation and means of household income for states in 1990 are reported in Tables 8C and 9C, respectively.

In the regression equation used to predict Cu90/CV, the labor and crime factors were significant at .01% level. The education factor was significant at the 2% level of significance and the family factor was

TABLE 4: Correlations and Significance Levels Between Indicator Variables Representing Social Capital Associated with Family Integrity, Educational Achievements, Crime, and Labor Market Participation by States, 1990[a]

	Correlation Coefficients and Significance Levels							
	Family (F90)		Education (E90)		Crime (C90)		Labor (L90)	
	BRST	IMR	HSGR	TNIS	LIT	VDT	LFPR	CPR
Family (F90)								
HHSFC (Households Headed by Single Females with Children)	.6743	.5936	-.6562	.5116	.4704	.2115	-.4017	.6584
	.000	.000	.000	.000	.000	.140	.004	.000
BRST (Birth Rates of Single Teens)		.7468	-.5398	.5125	.4829	.5235	-.5743	.7638
		.000	.000	.000	.000	.000	.000	.000
IMR (Infant Mortality Rates)			-.4232	.3556	.4876	.3800	-.2924	.4802
			.002	.011	.000	.006	.039	.000
Education (E90)								
HSGR (High School Graduation Rates)				-.6071	-.3166	-.2498	.2371	-.5661
				.000	.025	.080	.097	.000
TNIS (Percentage of Teens Not in School)					.4996	.3882	-.3832	.6059
					.000	.005	.006	.000
Crime (C90)								
LIT (Litigation Rates)						.4380	-.3816	.4842
						.001	.006	.000
VDT (Violent Death Rates Among Teens)							-.2552	.5298
							.074	.000
Labor (L90)								
LFPR (Labor Force Participation Rates)								-.6998
								.000

Source: Estimated by the authors

a The significance level of the second number is the probability that the correlation between variables is zero.

significant at the 9% level. The expenditures per person for health costs were significant in reducing the coefficient of variation at the 6% level of significance.

In the regression equation used to predict mean household incomes by state, the education factor was significant at the 5% level. The family factor was not significant. The labor and crime factors were significant at the .1% level or higher. Finally, transfer payments for health were significant at the 6% level.

Social Welfare Functions and Preferred Income Distributions, 1990

Besides the social capital hypotheses that relate changes in social capital to changes in the level and dispersion of income, another important question is: can we assert that one household income distribution is preferred to another? The answer is yes if some important assumptions are adopted.

Assume that all individuals derive the same utility from their own consumption of income and that selfishness of preference dominates. Assume also that in the society under investigation that each member's utility function measured over own income is increasing and concave down. Furthermore, assume that each income distribution is related to another by location-scale (Meyer).

If the utility function satisfies von Neumann-Morgenstern axioms underlying expected utility, then it is possible to rank distributions using a mean-standard deviation frontier. This ranking suggests that if two income distributions have the same expected household income but different standard deviations of household income, the distribution with the smaller standard deviation of income is socially preferred because it generates the greater level of satisfaction for society. On the other hand, if one distribution has a higher mean for household income and also a greater standard deviation, then society cannot indicate a preference for one distribution or the other without imposing much stronger restrictions on each member of society's utility function.[14] The mean-standard deviation frontier for states in 1990 is presented in Figure 9.

If we are willing to add additional assumptions about the slopes of indifference curves in mean-standard deviation space, then we may find the preferred income distributions along a mean-coefficient of variation frontier. Along the adjusted mean-coefficient of variation frontier, distributions with the highest expected value of income for the same coefficients of variation are preferred. Whether the slope along the mean-coefficient of variation frontier is positive or negative depends on the slope of the mean-standard deviation frontier. If the slope on the mean-standard deviation frontier exceeds one, that is, mean values are increasing faster than standard deviations, the slope of the mean-coefficient of variation frontier is downward sloping.

The mean-coefficient of variation frontier for states in 1990 frontier is described in Figure 10 and is downward sloping as suggested by our earlier deductions. According to our criteria, those states with the highest means for household incomes in Figure 10 dominate since they also have the lowest coefficients of variation.

Coefficients of variation and adjusted mean household incomes in descending order are reported in Tables C6 and C7. The inference from Figure 9 and Tables C6 and C7 is that states differ in their social capital bases and some states have income distributions preferred to those in other states. Maryland, Connecticut, Virginia, Illinois, and Utah have the highest mean household incomes. Maryland, Hawaii, Utah, Washington, and Virginia have the lowest coefficients of variation.

Finally, Table C8 reports the regression results of means regressed on coefficients of variation associated with household incomes for states in 1990. The regression results support relationships described in Figure 6 that mean incomes for households decrease with increases in the coefficients of variation. The regression results suggest that variation in income measured using coefficients of variation decrease with increases in mean household incomes.

XII. Statistical Results for States, 1980

Correlations Between Indicator Variables

Correlations and statistical significance levels for indicator variables for states in 1980 are reported in Table 5. Correlations between indicator variables within groups are bolded and boxed as they were in Table 4. Of particular interest for this study is to compare the correlations between 1980 and 1990 for states. Robustness of results would lead us to predict

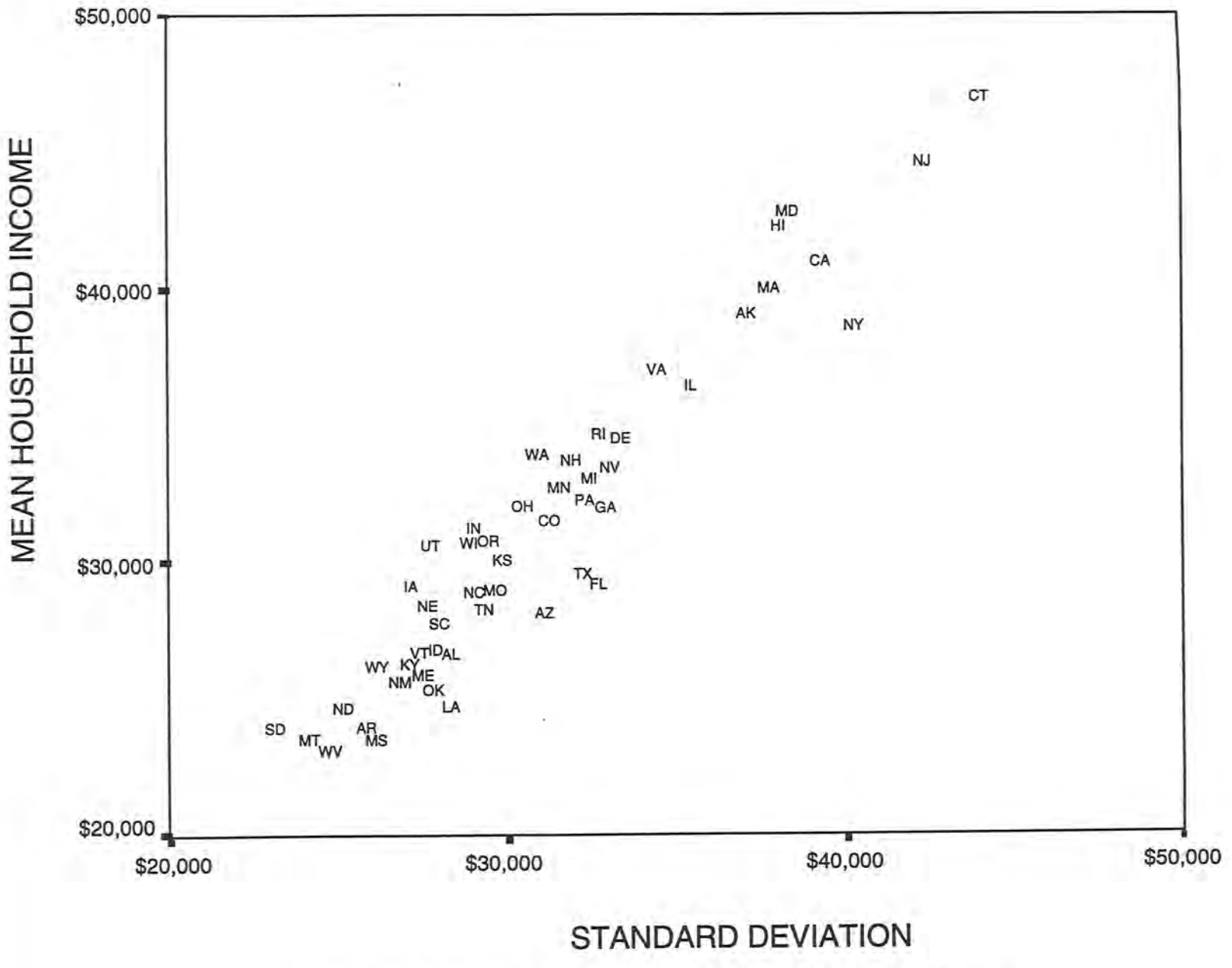

FIGURE 9. The Mean-Standard Deviation Frontier for States in 1990

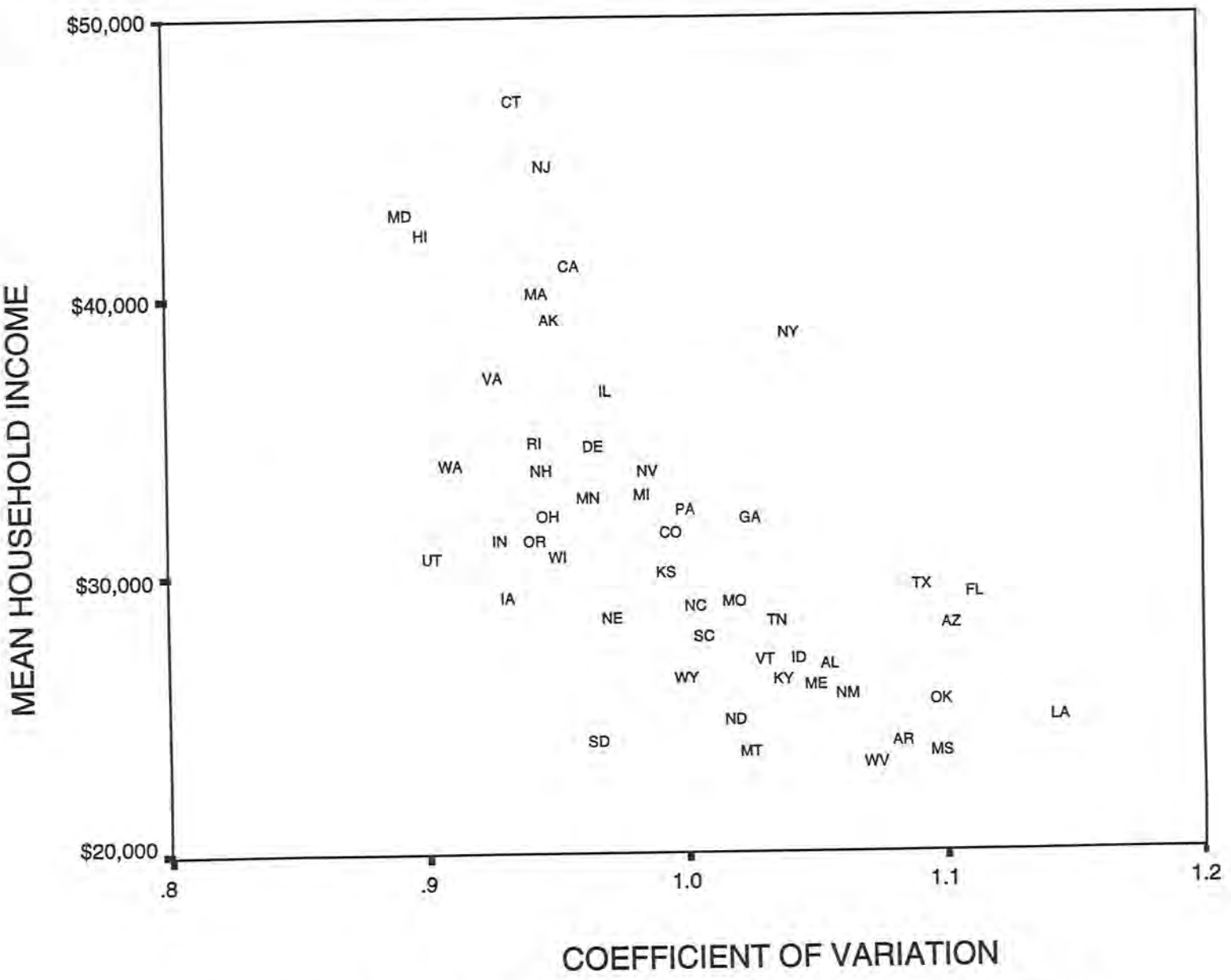

FIGURE 10. The Mean-Coefficient of Variation Frontier for States in 1990

similar results between 1980 and 1990. Any significant changes between 1980 and 1990 should be explained in terms of changing levels of social capital. The most significant change in the 1980 and 1990 correlations occurred in the correlation between households headed by single females with children and birth rates from single teens. In 1990, the correlation was 67%. In 1980, the same correlation was only 8% and not significant.

The change in the correlations between households headed by single females with children and birth rates from single teen variables reflects an important national trend. The trend is the increasing rate of households headed by single females with children who have never married. In 1980, the marital status of children living with their mothers only indicated that 15% of the mothers had never married. In 1990, the percentage of mothers with children under 18 had increased to 31%. In 1995, this percentage had reached 35.5%.

One trend that has not changed is the dominance of single mothers compared to single fathers heading households with children under the age of 18. In 1980, 92% of the children under 18 living with a single parent lived with their mothers. In 1990, this same percent was 87% and was also equal to 87% in 1995.[15] In the past, an absent spouse and death were relatively more significant in explaining the number of households headed by single females with children. While divorce's contribution to the number of single-parent households headed by single females with children has been relatively constant, births from unmarried teens have increased significantly its contribution to the number of households headed by single females with children, relatively speaking.

To measure the correlations between indicator variables and income distribution measures suggested by equations (8) and (9), we again calculated means and coefficients of variation using household income data from the 1980 U.S. Bureau of the Census. For the reasons described earlier, we measured income dispersion using coefficients of variation.

Having measures of means and coefficients of variation of incomes for households by state for 1980, we next calculated the correlations between indicator variables and coefficients of variation and mean incomes for households. These correlations are reported in Tables D1 and D2, respectively.

The correlations between coefficients of variation (Cu80/CV) and the indicator variables are all significant and have the correct sign except for F80/HHSFC and C80/VDT which are not significant. The most significant correlations are between Cu80/CV and F80/BRST (70% compared to 54% in 1990), L80/CPR (86% compared to 76% in 1990), E80/HSGR (-72% compared to -34% in 1990), E90/TNIS (51% compared to 39% in 1990), and L80/LFPR (-67% compared to -68% in 1980).

Correlations between means of household incomes (Cu80/M) and indicator variables reported in Table D14 showed three of the indicator variables to be insignificant. These three variables uncorrelated with Cu80/M were F80/IMR, C80/LIT, and C80/VDT. The remaining indicator variables were significant and had the expected signs.

F80/HHSFC was unexpectedly positively correlated with Cu80/M. This coupled with the insignificant correlation between F80/HHSFC and Cu80/CV suggests that the interpretation of the variable HHSFC has changed between 1980 and 1990. This change that has been referred to earlier is the increasing importance of births from unwed mothers in the creation of households headed by single females with children.

Factor Analysis

We intended to determine the extent to which coefficients of variation and mean household income could be predicted using our indicator variables. Because of the large number of indicator variables, their influence was summarized using factor analysis. Eighty-one percent of the variance associated with the indicator variables was captured using four factors. The factors are listed in Table D3. The factors are consistent with the family, education, labor, and crime groupings except for one of the two crime variables, C80/LIT.

Next, efforts were made to predict differences in 80/CV and 80/M using the four factors described in Table D3 and one income transfer variable, 80/H. Regression results using the four factors and one transfer variable to predict 80/CV and 80/M are reported in Tables D4 and D5, respectively.

TABLE 5: Correlations and Significance Levels Between Indicator Variables Representing Social Capital Associated with Family Integrity, Educational Achievements, Crime, and Labor Market Participation for States, 1980[a]

	Correlation Coefficients and Significance Levels							
	Family (F80)			Education (E80)		Crime (C80)		Labor (L80)
	HHSFC	BRST	IMR	HSGR	TNIS	LIT	VDT	LFPR	CPR
Family (F80)									
HHSFC (Households Headed by Single Females With Children)	.0825 .5696	.3487 .013		.0054 .971	.1814 .207	.4305 .002	.2533 .076	.2568 .072	.1869 .194
BRST (Birth Rates of Single Teens)		.6623 .000		-.7709 .000	.7689 .000	.4815 .000	.2718 .056	-.5554 .000	.7841 .000
IMR (Infant Mortality Rates)				-.6684 .000	.4119 .003	.4484 .001	.0682 .638	-.3981 .004	.6779 .000
Education (E80)									
HSGR (High School Graduation Rate)					-.4618 .001	-.2915 .040	.1505 .297	.6264 .000	-.7777 .000
TNIS (Percentage of Teens Not in School)						.4187 .002	.4321 .002	-.3268 .021	.5529 .000
Crime (C80)									
LIT (Litigation Rates)							.4343 .002	-.2011 .161	.4466 .001
VDT (Violent Death Rates Among Teens)								.0729 .615	.1949 .175
Labor (L80)									
LFPR (Labor Force Participation Rates)									-.6555 .000

Source: Estimated by the authors

a Significance levels of the second number on each level represent the probability that the correlation between variables is zero

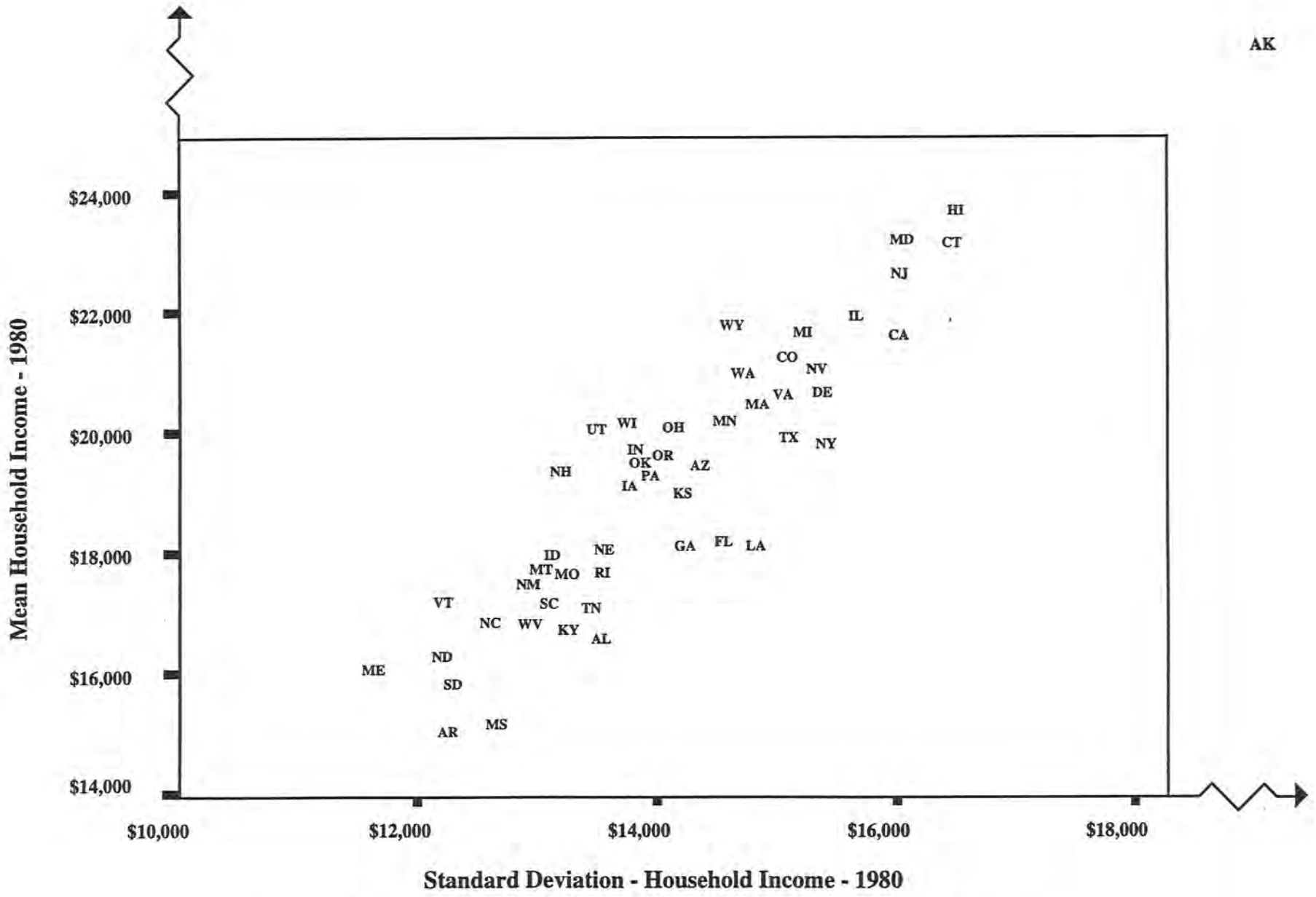

FIGURE 11. The Mean-Standard Deviation Frontier for States in 1980

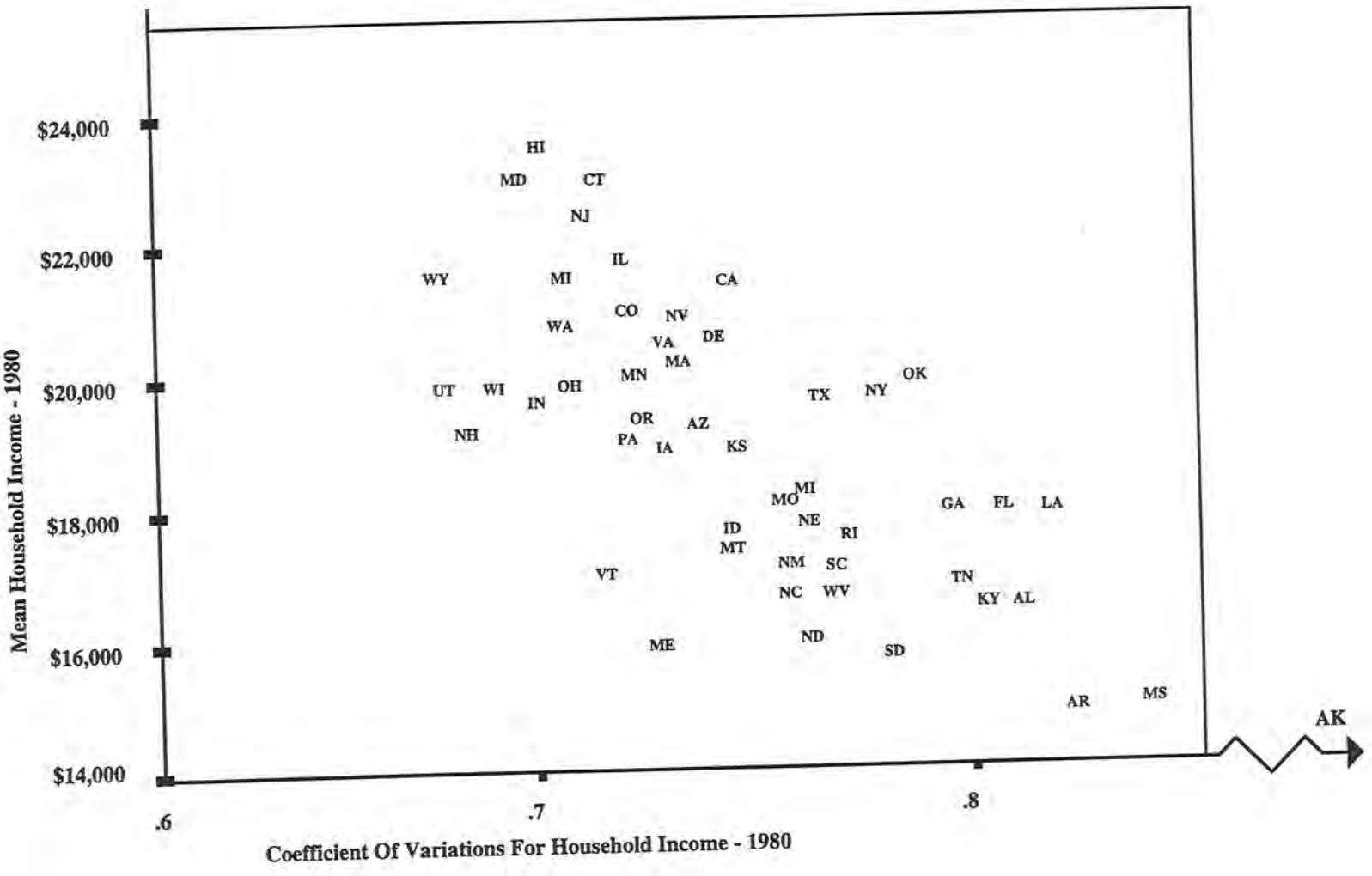

FIGURE 12. The Mean Coefficient of Variation Frontier for States in 1980

Coefficients of variation and mean household incomes in descending order are reported in Tables D6 and D7. The inference from Figures 11 and 12, Tables D6 and D7 is that states differ in their social capital bases and some states have income distributions preferred to those in other states. Alaska, Hawaii, Maryland, Connecticut, and New Jersey have the highest mean household incomes. Alaska, Wyoming, Utah, and New Hampshire have the lowest coefficients of variation.

In the regression equation used to predict Cu80/CV, all but the family factor were significant at less than the 1% level of significance. In the regression equation used to predict mean incomes for households, all but the crime factor were significant at less than the 1% level of significance. In addition, T80/H variable was not significant in increasing Cu80/M.

Social Welfare Functions and Preferred Income Distributions, 1980

Figure 12 describes the relationships between mean household income for states in 1980 (Cu80/M) and coefficients of variation for states in 1980 (Cu80/CV). The relationship between Cu80/M and Cu80/CV is negative in Figure 12 as it was in Figure 1. This negative relationship points out the tendency for Cu80/M to increase at a faster rate than does Cu80/CV. Thus, the coefficient of variation increases with decreases in the mean household income. As a result, if one uses Cu80/CV as one's measure of income inequality as we do, then there is no reduction in income disparity associated with reduced values of Cu80/M as suggested by the Kuznets' law. In other words, rather than suggestina stage of economic development, the income dispersion is more a reflection of social capital levels.

Finally, Table D8 reports the regression results of adjusted mean household income on coefficients of variation measured by state. The regression results support the view that mean incomes decrease with increases in the coefficients of variation.

XIII. A Comparison of 1980 and 1990 Income Distributions

Having calculated means and coefficients of variations of incomes for households by state for 1980 and 1990, it was next determined to construct a measure of the changes in these variables between 1980 and 1990. One measure is obtained by forming the ratio of mean incomes for households in 1990 and 1980 after adjusting 1980 dollars to their equivalent 1990 dollars. A ratio of one would indicate that the mean household incomes have not changed in real terms. A ratio of greater than (less than) would suggest real incomes for households have improved (become worse) on average between 1980 and 1990.

Similarly, ratios were formed from coefficients of variation calculated in 1990 and 1980. Dividing coefficients of variation calculated for 1990 by coefficients of variation calculated for 1980 forms a ratio of two percentages which do not require adjustments for changes in the price indices. A ratio Cu90/CV to Cu80/CV equal to one suggests that on average, the dispersion of income around the mean income has not changed during the decade of the 80's. A ratio greater than (less than) one indicates that on average, the dispersion of income around the mean has increased (decreased).

To evaluate the changes between 1980 and 1990, one might consider a quadrant of possible values. Let the vertical axis represent the ratios of mean incomes for households, and let the horizontal axis represents the ratios of coefficients of variation. Then, the center of the axis represents a stationary position. The northeast quadrant represents increases in the mean ratio, a good, but also increases in dispersion, a bad. The northwest quadrant represents increases in the mean ratio, a good, and also reductions in dispersion, also a good. The southwest quadrant represents decreases in mean incomes, a bad, but also decreases in dispersion, a good. Finally, the southeast quadrant represents decreases in mean income, a bad, and increases in dispersion, also a bad (see Figure 13).

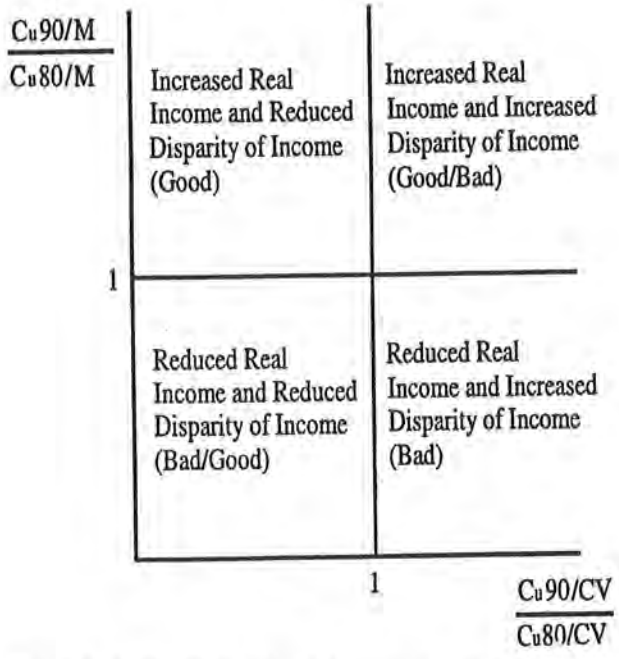

FIGURE 13. Relative Changes in Means and Coefficients of Variations of Household Incomes, 1980 and 1990

Figure 14 plots the actual ratios of means and coefficients of variation by states. It would be preferable to see the observations located in the northwest quadrant. Unfortunately, there were no observations in the northwest quadrant, nor in the southwest quadrant. All of the observations were located in the northeast and southeast quadrants. Those states located in the northeast quadrant showed improved incomes but increased dispersions of incomes. Those states located in the southeast quadrant showed both reduced incomes and increased dispersion. Included in this least desirable quadrant were the states of Wyoming, Arkansas, Montana, Louisiana, West Virginia, Oklahoma, and Arizona.

In contrast, Rhode Island ranked near the top for improvement in income with the smallest increase in dispersion of income. Other states showing a significant improvement in incomes were Connecticut, Maine, New Jersey, New York, California, and Maryland. Table D9 lists the states by increases in income and coefficients of variation.

XIV. Income Distribution Changes by Race

A characteristic of today's world is the division social capital along racial boundaries. Efforts to redu the consequences of social capital ordered by rac have been discussed elsewhere and are not the focus this study. Our interest is in examining the income di tributions of racial classes to determine the level existing income distributions and changes in these di tributions between 1980 and 1990. It may be impos ble to identify a particular individual as a member o unique racial group. Any one individual may belong several depending on his or her genealogy. Neverth less, respondents did self-identify themselves belonging to a particular race and these observatio were used in this study to calculate means and coef cients of variation.

Racial categories examined in this study we Native Americans, Asians, African Americans, H panics, and Whites. In addition, a total populati statistic was calculated. For each of the races and t the total population, means and coefficients of var tion were calculated using U.S. Census data for t two census years 1980 and 1990. In 1980, Asia and Whites had the highest mean incomes and a the lowest disparity of incomes measured by t coefficient of variation. Native Americans a African Americans had nearly equal levels of inco in 1980 but African Americans had a higher dispar of income, .86 compared to .80 for Native Ame cans. By 1990, Asians enjoyed both the highest le of income and also the lowest disparity of inco among racial groups. Whites continued to enj income levels above American Indians, Hispani and African Americans.

Relative changes in the income position of races between 1980 and 1990 are described in Fig 17. Native Americans showed the greatest relat improvement in levels of income between 1980 1990 followed by Asians. African Americans Hispanics saw their real income decrease between two census years. Most significant among changes was the disparity among whites. Compa to 1980, the disparity of income among wh increased by over 8% and registered the grea increase in disparity for all groups. The mean ra and ratios of coefficients of variation are reporte Table E2.

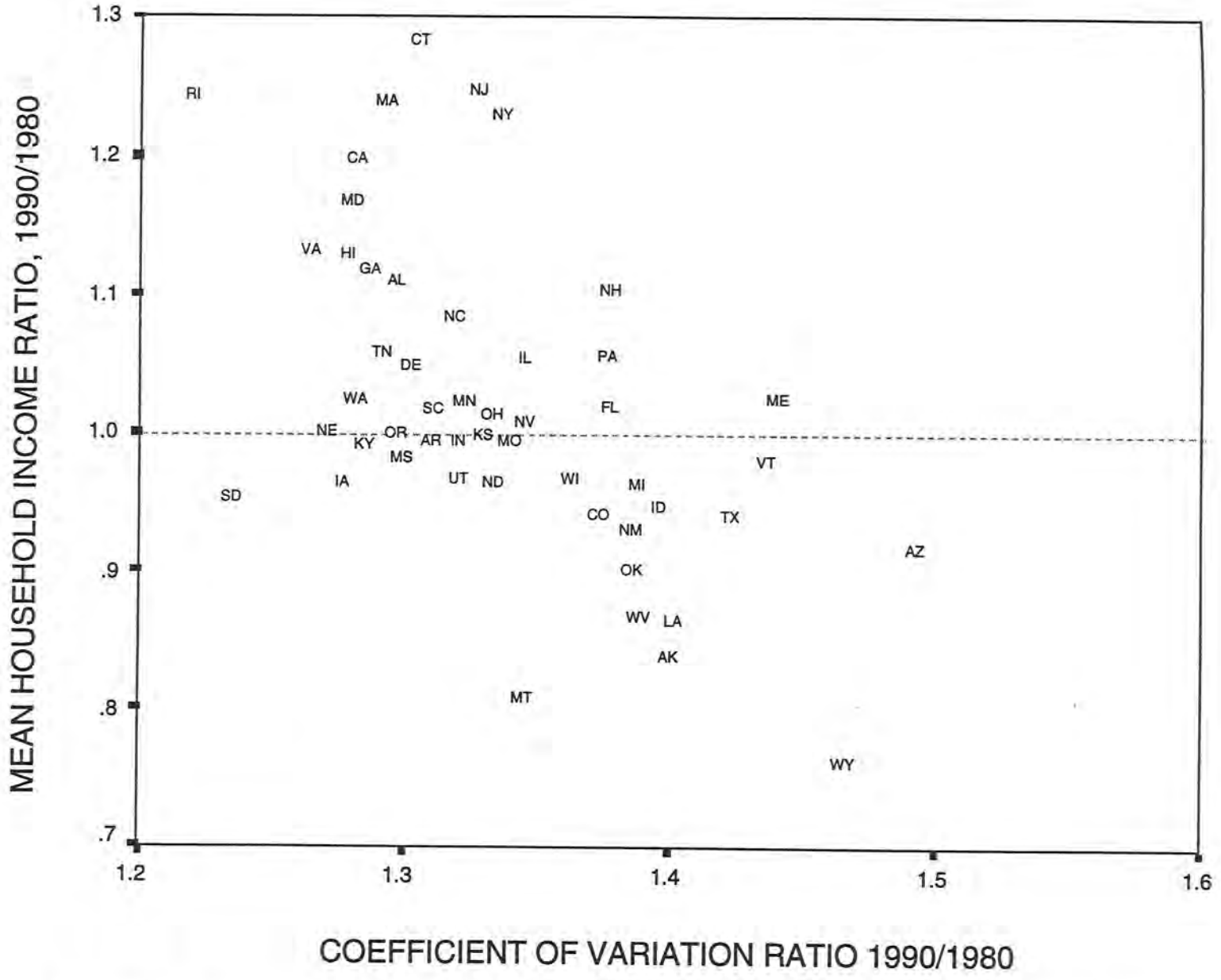

FIGURE 14. The Mean Ratio and Coefficient of Variation Ratio for States in 1990/1980

The other important point to notice about the results by race is how low are the CVs compared to the CVs reported by states. This is possible because part of the significant difference in the CV is accounted for by variations between the races. However, this does not explain the low total population CV. These differences are explained in part by the use of different samples such as PUMS 1980, PUMS 1990 and CPS 1990/1991.

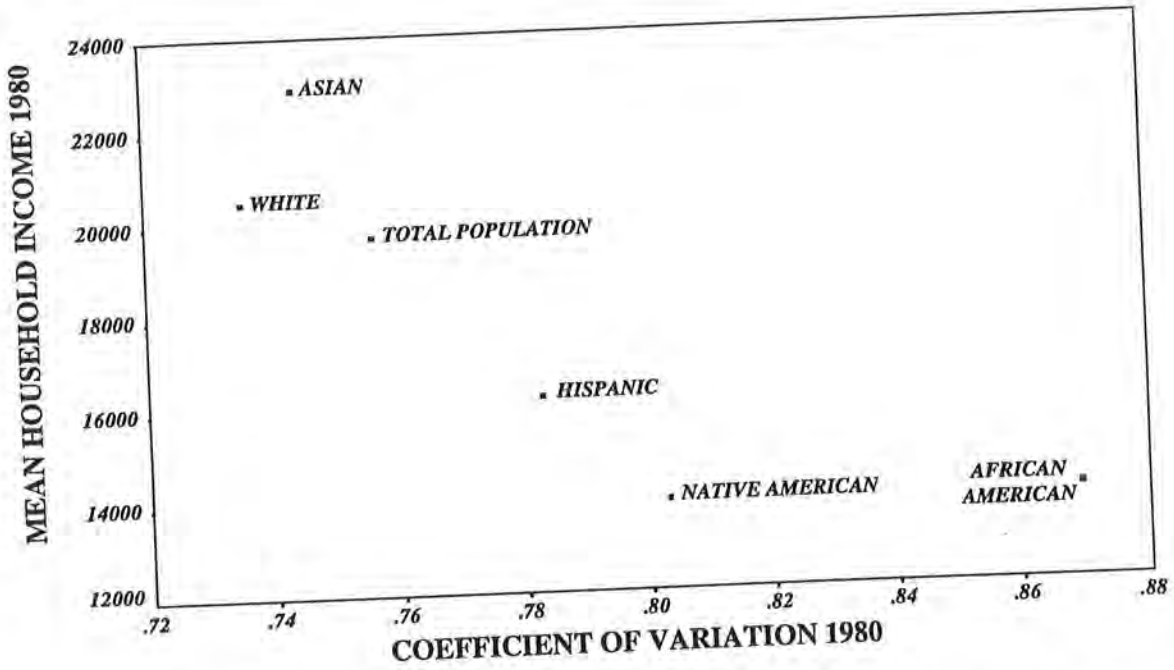

FIGURE 15. The Mean Coefficient of Variation Frontier by Race in 1980

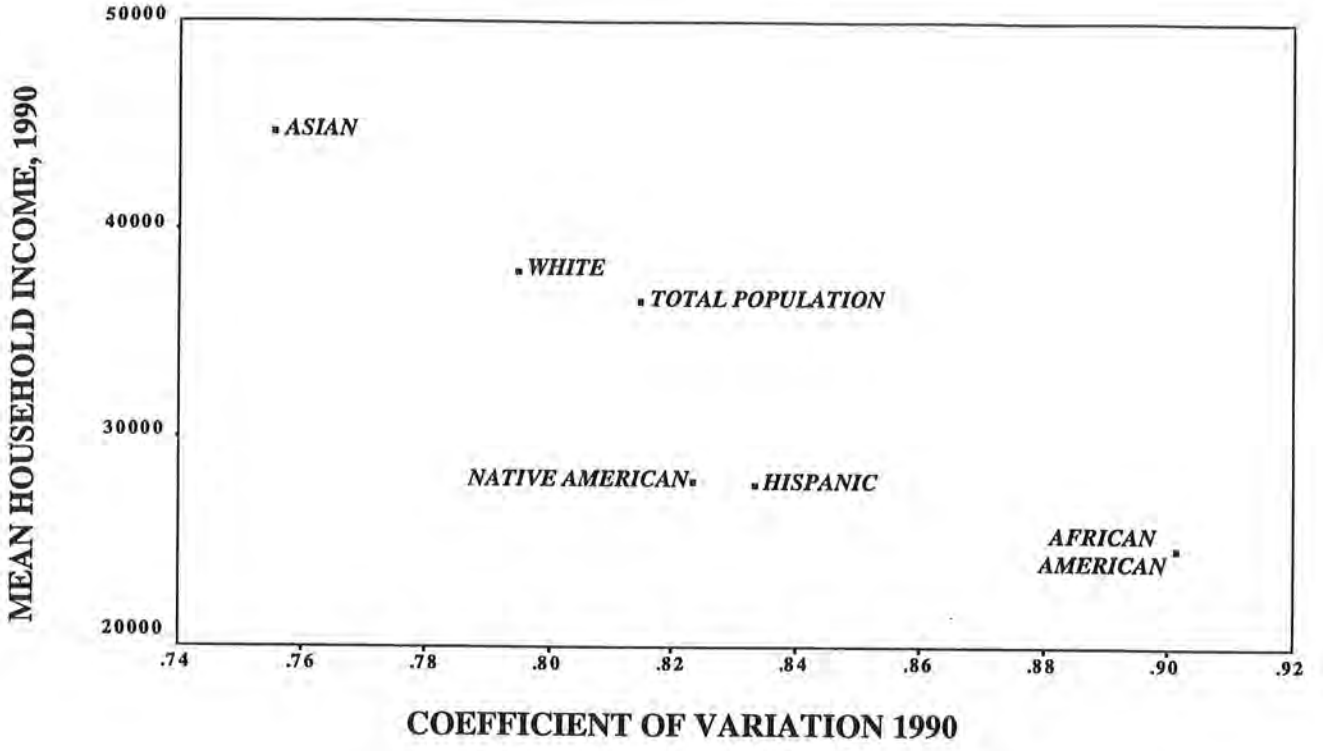

FIGURE 16. The Mean Coefficient of Variation Frontier by Race in 1990

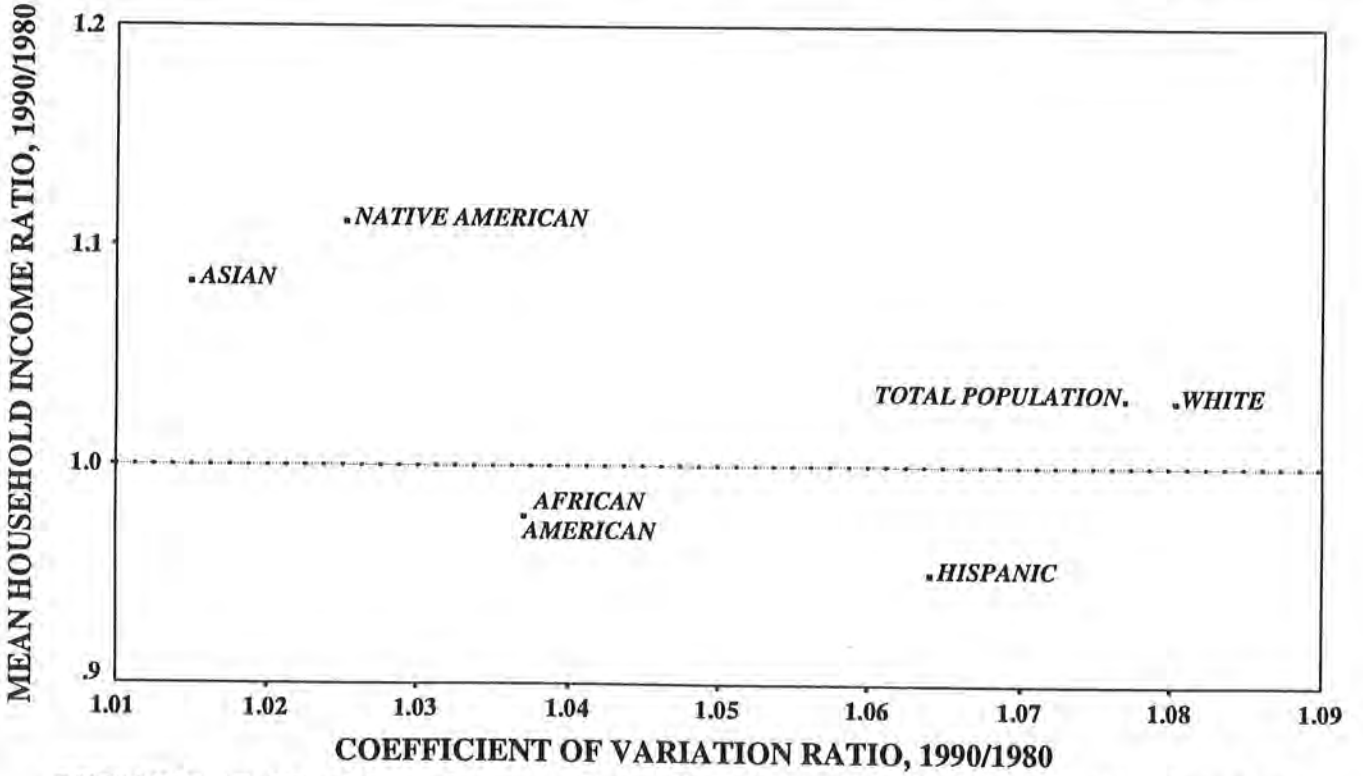

FIGURE 17. The Mean Income Ratio Coefficient of Variation Ratio Frontier by Race in 1990/1980

XV. Summary and Conclusions

This paper began by presenting evidence that relationships alter the terms of trade in predictable ways. Next, the concept of social capital was introduced and defined. The similarities between social capital and other forms of capital made it possible to include its effect in a neoclassical model of utility maximization from which several important theoretical linkages were made between increases in social capital and changes in the mean and coefficient of variation of income.

It was demonstrated that when an economic agent's activity produced an externality, that increases in social capital would tend to internalize the externality to the agent. As a result, increases in social capital would increase the expected level of income and under some conditions reduce the difference in income. The theoretical results from the externality models also suggested that externally imposed redistributive efforts are likely to be at least partially offset by voluntary income distribution effects realized through production decisions. However, this conclusion was deduced in a very restricted model and needs additional examination in other settings. Nevertheless, the result raises the question whether public effort at redistribution of income can be successful without sufficient levels of social capital being provided by those whose income is being transferred to lower income groups.

The influences of social capital and group size were deduced next. The conclusion deduced was that opportunities for specialization and trade can be significantly reduced when, for whatever reason, groups divide. This reduction in specialization and trade opportunities as well as limiting the extent to which externalities are internalized may have important consequences on the level and disparity of incomes.

Empirically relevant to the conclusion that divisions or breakdowns in existing groups have undesirable consequences on the distribution of income is the breakdown of the two-parent family within the United States. The predicted consequence on household income in the United States was a reduction in the level and an increase in the disparity of income of households.

A considerable effort was then made to test the general and specific hypotheses. The general hypothesis was that decreases in social capital reflected by selected indicator variables, particularly the number of households headed by single females with children, would both reduce the level and increase the dispersion of household income.

Indicator variables suggested for this purpose had to do with the family integrity, educational achievements, crime, and labor force participation. Using primary data from the 1980 and 1990 U.S. Census and secondary data from various sources, empirical tests were performed and reported at the state level.

The empirical section of this paper also tested for changes in the level and disparity of household incomes between 1980 and 1990 and tested for differences in household income distributions by race.

The empirical results provided support for the hypothesis that changes in the indicator variables indicating reduced levels of social capital had the effect of reducing the level of income and increasing the disparity of income between households. Interestingly enough, the indicator variables were highly correlated suggesting they jointly were measuring a similar trend.

Obviously, the results presented in this paper need to be tested in other settings. Such analyses might examine the relationship between increases in social capital and the means and coefficients of variation in counties, cities, and businesses. Still, other studies might examine in more detail which factors contribute to social capital formation.

Endnotes

1 Including the effects of relationships in traditional economic models may be considered the domain of an emerging subdiscipline of economics referred to as socio-economics (Swedberg, 1990).

2 While James Coleman has popularized the term social capital, Portes and Landolt credit Pierre Bourdieu with originating the term in the 1970's.

3 The references to social capital work cited here are not intended to discount the large amount of research that supports social capital conclusions but does not use the words "social capital." For example, important studies have focused on the importance of networks in reducing income differences between men and woman (Bartlett and Miller). This work might easily be interpreted as supporting the conclusion that social capital matters in determining salary levels.

4 We are grateful to Allan Schmid for his insights on the nature of externalities, some of which are included in this section.

5 To model a high exclusion cost good, assume agents i and j begin the period with resources α and β, respectively. Then, assume agents i and j invest in α and β, respectively, in a high exclusion cost good whose production of services is represented by the function $f_h(\alpha+\beta)$. Then, investments in the high exclusion cost good leave agents i and j with investments in individual goods of $(\alpha-\bar{\alpha})>0$ and $(\beta-\bar{\beta})>0$, respectively. Income for agent i can be expressed as:

$$\pi_i(\alpha) = \pi_i [f_H(\alpha,\beta),(\bar{\alpha}-\alpha)]$$

6 To model a joint production model, assume agents i and j begin the period with resources α and β, respectively. Ownership of resources α and β imply the right to create externalities. Also assume agents i and j invest α and β, respectively, in the joint enterprise whose output is represented by the function $f_J(\alpha,\beta)$ that is assumed to be increasing and concave down in α and β. Then, assume investments in the joint enterprise leave agents i and j with investments in individual production activities of $(\alpha-\bar{\alpha})$ and$(\beta-\bar{\beta})$, respectively. Assume agent i receives γ percent of the joint output. Income for agent i can be expressed as:

$$\pi_i(\alpha) = \pi_i [\gamma f_J(\alpha,\beta),(\bar{\alpha}-\alpha)]$$

7 To model a good owned in common, assume agents i and j initially extract services of α and β, respectively, from a common resource. Also assume the cost of resource extraction is represented by $f_c(\alpha,\beta)$ that is assumed to be an increasing and concave down function of α and β. Income for agent i can be expressed as:

$$\pi_i(\alpha) = \pi_i [fc(\alpha_1\beta),\alpha]$$

8 To model a ubiquitous externality model, assume agent i engages in individual production that not only earns an income of $\pi_i(\alpha)$ but also diverts an input desired for alternative use by agent j. The negative value for agent j of the diverted input is $f_j(\alpha)$. Assume agent i chooses level of inputs α. Then j's income function can be written as:

$$\pi_j(\alpha,\beta) = \pi_j[\beta,f_j(\alpha)]$$

9 The conclusion that externally imposed income transfers will be offset to some degree by individual production decisions with external consequences is strengthened if the externally imposed income transfers reduce social capital. For example, those forced to contribute to the welfare of a particular group may come to dislike the group which reduces the likelihood of voluntary efforts to redistribute income.

It is important to note the limitation of the conclusions reached in Appendix B. It has not been demonstrated that these results can be applied to an n person economy. It may be that persons are willing to contribute to the well-being of others if they know that others are contributing as well. Thus, an externally imposed tax might have the effect of encouraging more general support for income transfers. The main point here is that social capital needs to be included in any effort to examine the likely consequences of income transfer policies.

10 This approach was implemented by Pope, Kramer, Green, and Gardner to demonstrate the lack of robustness in land valuation models.

11 Data representing the percentage of households headed by single parents with children were collected using the 1990 Census of Population and Housing U.S. Summary tape file 1C,U.S. Department of Commerce, Bureau of the Census, issued February 1992, CD90-1C.

12 For this purpose we used PUMS 1990. Household incomes are reported for 1989.

13 Factor analysis is a multivariate statistical method. Factor analysis is used to identify measures of underlying variables by analyzing the variation and cross-correlation within an observed variable set. This is accomplished through the generation of variables or factors that are highly correlated with some subset of the variables of interest and are independent of one another. Thus, factor analysis reduces an original set of indicator variables to a smaller set of underlying variables. The use of factor analysis in this study is to reduce a comparatively large set of indicator variables to a few variables which can be used to predict adjusted mean household income and the coefficient of variations.

14 Alternatively, the mean-standard deviation (coefficient of variation) efficient set is supported if one assumes perfect social capital and the distributions are related to each other by location-scale.

15 Marital Status and Living Arrangements: March 1995, PPL-52, Arlene F. Saluter, Fertility and Family Statistics Branch Population Division (301) 457-2465.

Appendix A

Income Distributions of Increases in Social Capital

To model the influence of relationships on economic activities, the potential influence j has on the terms of trade offered by i is represented by the social capital function $k_{ij}(d_{ij},r_{ij})$ where dij is the social distance and rij is the relationship (sympathy or antipathy) between agents i and j. If d_{ij} and r_{ij} are considered to be exogenous, then the relationship function is represented by the social capital coefficient k_{ij}. Otherwise, the social capital function $k_{ij}(d_{ij},r_{ij})$ is assumed to decrease with increases in d_{ij} for $r_{ij}>0$ and to increase with increases in r_{ij} for finite d_{ij} values. Positive values of k_{ij} reflect a resource for person j because an increase in j's well-being increases i's sense of well-being. So, an increase in k_{ij} increases person i's willingness to offer j more favorable terms of trade, other things being equal.

Assume an economy consisting of two economic agents i and j whose preferences are described by ordinal utility functions $U_i[\pi_i(\alpha),\pi_j(\alpha),k_{ij}]$ and $U_j[\pi_j(\alpha),\pi_i(\alpha),k_{ji}]$, respectively. The arguments of the utility functions $\pi_i(\alpha)$ and $\pi_j(\alpha)$ represent income received by agents i and j, respectively, while k_{ij} represent social capital coefficients defined for agents i and j. Furthermore, it is assumed that agent i's income function is increasing and concave in his/her choice variable α that has external consequences on agent j's income function $\pi_j(\alpha)$. Finally, we assume that for $0 < k_{ij} < 1$, the following are true:

$$\text{(A-1a)}\ \frac{\partial^2 U_i}{\partial \pi_j \partial k_{ij}} > 0; \qquad \text{(A-1b)}\ \frac{\partial^2 U_i}{\partial \pi_j \partial k_{ij}} = 0; \quad \text{and (A-1c)}\ \frac{\partial^2 U_i}{\partial \pi_j \partial \pi_i} > 0 \qquad \text{(A-1)}$$

The assumptions in equation (A-1) imply the following for $0 < k_{ij} < 1$: (A-1a) implies that agent i's marginal utility associated with an increase in agent j's income increases with an increase in agent j's social capital; (A-1b) implies that the marginal utility of own consumption is unaffected by an increase in agent j's social capital; (A-1c) implies that incomes of agents i and j are complements in preferences.

Next, consider the economic consequences on agents i and j's income and difference in income as social capital represented by social capital coefficient is increased. To begin, we write the first-order condition for agent i choosing his/her utility maximizing level of α as:

$$\frac{dU_i}{d\alpha} = \frac{\partial U_i}{\partial \pi_i(\alpha)} \frac{\partial \pi_i(\alpha)}{\partial \alpha} + \frac{\partial U_i}{\partial \pi_j(\alpha)} \frac{\partial \pi_j(\alpha)}{\partial \alpha} = [.] = 0 \qquad \text{(A-2)}$$

It is assumed that the second-order condition for α holds so that $\frac{\partial [.]}{\partial \alpha} < 0$ and differentiating the first-order condition with respect to k_{ij} results in the expression:

$$\frac{d\alpha}{dk_{ij}} = \frac{-\dfrac{\partial^2 U_i}{\partial \pi_j(\alpha) \partial k_{ij}} \dfrac{\partial \pi_j(\alpha)}{\partial \alpha}}{\dfrac{\partial [.]}{\partial \alpha}} \qquad \text{(A-3)}$$

From our earlier assumption, it follows that the sign of $\frac{d\alpha}{dk_{ij}}$ depends on whether an increase in α produces positive or negative externalities. If an increase in α produces positive (negative) externalities, an increase in k_{ij} increases (decreases) α.

Next, consider how an increase in social capital affects the total income of agents i and j equal to $\pi_T = \pi_i(\alpha) + \pi_j(\alpha)$ and the difference in incomes equal to $\pi_D = \pi_i(\alpha) - \pi_j(\alpha)$. Maximizing π_T with respect to α produces the result: (A-4)

$$\frac{d\pi_T}{d\alpha} = \frac{\partial \pi_i(\alpha)}{\partial \alpha} + \frac{\partial \pi_j(\alpha)}{\partial \alpha} = 0$$

The value for α that satisfies the first-order condition described above would never be chosen by agent i unless agent j's social capital with agent i were sufficiently positive ($k_{ij}>0$). In fact, if agent j had no social capital with agent i, agent i would maximize his/her own income without regard to the externalities created by his/her choice of α. Agent i's selfishness of preference choice of α would instead of satisfying the total income maximizing requirement would satisfy the requirement that $\frac{\partial \pi_i(\alpha)}{\partial \alpha} = 0$. But this choice, of course, would fail to maximize total income.

Assume that agent i has chosen his/her utility maximizing level of α, namely α^*. Next, consider the effect on α^* of an increase in k_{ij}. As agent j's social capital increases, the effect on total income can be expressed as:

$$\frac{d\pi_T}{dk_{ij}} = \left[\frac{\partial \pi_i(\alpha^*)}{\partial \alpha^*} + \frac{\partial \pi_j(\alpha^*)}{\partial \alpha^*} \right] \frac{\partial \alpha^*}{\partial k_{ij}} \qquad \text{(A-5)}$$

Assume positive externalities and $k_{ij} > 0$; then $\partial\alpha / \partial k_{ij} > 0$ in equation (A-5). Next, consider the sign of the bracketed expression in equation (A-5) by comparing it with the expression in equation (A-2). If agent i's marginal utility for own and agent j's income were equal, then the bracketed expression in equation (A-5) must equal zero. On the other hand, if agent i's marginal utility for own income were greater than (less than) his/her marginal utility for agent j's income, then the bracketed expression in equation (A-5) is positive (negative) and α^* increases (decreases) with an increase in k_{ij}. It is generally accepted that agent i values a unit increase in his/her own income more than the same units of income increase for agent j unless there are wide differences in their relative incomes. Thus, under most conditions, the sign of equation (A-5) is unambiguously positive.

Next, consider the effect of an increase in social capital on difference in income π_D. If the relative income levels before the increase in k_{ij} are $\pi_i(\alpha) > \pi_j(\alpha)$, and an increase in k_{ij} lowers $\pi_i(\alpha)$and increases $\pi_j(\alpha)$, it follows that an increase in k_{ij} reduces the difference in income between agents i and j.

Having established the results above, an important income distribution conclusion can be deduced from our model:

If $\pi_i(\alpha) > \pi_j(\alpha)$ and $0 < k_{ij} < 1$, *then increases in k_{ij} will increase total income and reduce differences in income.*

If relative income levels before the increase in k_{ij} are $\pi_i(\alpha) < \pi_j(\alpha)$, and an increase in a produces a much larger positive effect on $\pi_j(\alpha)$ compared to a small reduction in $\pi_i(\alpha)$, then an increase in k_{ij} would increase the difference in income. This consequence leads to a second income distribution conclusion:

If $\pi_i(\alpha) < \pi_j(\alpha)$ and $0 < k_{ij} < 1$, *then increases in k_{ij} will increase total income and reduce differences in income.*

Appendix B

Income Transfers and Social Capital

One limitation of the social capital models described earlier is that the only means of redistributing income is through the production process. Indeed, in many business arrangements, this characterization of income redistribution possibilities may be accurate. However, in most advanced economic arrangements, there exist income redistribution possibilities in addition to production arrangements. One means of redistribution is an outright transfer. Depending on whether the transfer is voluntary or involuntary has significantly different effects on agent *i*'s choice of α.

Assume a transfer of income between agents is required by an outside agent such as a government to narrow differences in their income. One might assume that if $\pi_i(\alpha) > \pi_j(\alpha)$, then the government might require agent *i* to transfer to agent *j* income of amount δ. In contrast, if $\pi_i(\alpha) < \pi_j(\alpha)$, then the government might require agent *j* to transfer to agent *i* income of amount δ.

Facing the possibility of a forced income transfer, agent *i*'s utility function is $U_i[\pi_i(\alpha) - \delta, \pi_j(\alpha) + \delta, k_{ij}]$ and the first-order condition for *i*'s choice of α is again that described in equation (A-3). Now consider agent *i*'s response to an increase in the required transfer δ. Differentiating equation (A-3) with respect to δ, we obtain:

$$\frac{d\alpha}{d\delta} = \frac{\dfrac{\partial^2 U_i}{\partial[\pi_i(\alpha)-\delta]^2}\dfrac{\partial \pi_i(\alpha)}{\partial \alpha} - \dfrac{\partial^2 U_j}{\partial[\pi_j(\alpha)-\delta]^2}\dfrac{\partial \pi_j(\alpha)}{\partial \alpha} - \dfrac{\partial^2 U_i}{\partial[\pi_j(\alpha)+\delta]\partial[\pi_i-\delta]}\left[\dfrac{\partial \pi_i(\alpha)}{\partial \alpha} - \dfrac{\partial \pi_j(\alpha)}{\partial \alpha}\right]}{\dfrac{\partial[\cdot]}{\partial \alpha}} \qquad \text{(B-1)}$$

for $\delta > 0$ where:

$$\frac{\partial \pi_i(\alpha)}{\partial \alpha} \lesseqgtr 0, \quad \left[\frac{\partial \pi_i(\alpha)}{\partial \alpha} - \frac{\partial \pi_j(\alpha)}{\partial \alpha}\right] < 0, \text{ and } d\alpha/d\delta < 0.$$

If increasing α produces positive externalities for agent *j*, then $\partial \pi_j(\alpha)/\partial \alpha > 0$,

$$\frac{\partial[\pi_i(\alpha) - \delta]}{\partial \delta} = -1 \text{ and } \frac{\partial[\pi_j(\alpha) + \delta]}{\partial \delta} = 1.$$

and $d\alpha/d\delta < 0$. This suggests that redistribution of income through externally imposed transfers reduces the transfers previously made through production. If increasing α produces negative externalities for agent *j*, then $d\alpha/d\delta > 0$.

On the other hand, if $\delta < 0$, requiring a transfer from agent *j* to agent *i*, then $d\alpha/d\delta > 0$ for positive externalities and $d\alpha/d\delta < 0$ for negative externalities. Again, the implications are that externally imposed redistributive efforts will be offset by redistribution efforts made through production decisions. Furthermore, the results would be strengthened if the externally imposed transfers reduced social capital.

In contrast to required redistributions, suppose that the redistributive efforts were voluntary and agent *i* chooses δ to maximize his/her own utility. Provided that $\pi_i(\alpha) > \pi_j(\alpha)$, the assumptions in equation (A-1) imply that:

$$\frac{d\delta}{dk_{ij}} > 0 \qquad \text{(B-2)}$$

suggesting that increases in social capital will unambiguously reduce the difference in income between agents *i* and *j* when $\pi_i(\alpha) > \pi_j(\alpha)$.

Appendix C

Social Capital Indicator Variables and Income Distributions for the U.S., 1990

Table C1. Correlation Coefficients Between Indicator Variables and Coefficients of Variation by State, 1990

Variable	Correlation Coefficient	Significance Level
Family (F90)		
Households Headed by Single Female with Children (F90/HHSFC)	.4013	.004
Rate of Births from Single Teens (F90/BRST)	.5396	.000
Infant Mortality Rates (F90/IMR)	.3038	.032
Education (E90)		
High School Graduation Rates (E90/HSGR)	-.3413	.015
Teens not in School (E90/TNIS)	.3867	.006
Crime (C90)		
Litigation Rates (C90/LIT)	.4985	.000
Violent Death Rates for Teens (C90/VDT)	.5228	.000
Labor (L90)		
Labor Force Participation Rates (L90/LFPR)	-.6800	.000
Poverty Rates for Children (L90/CPR)	.7572	.000

Source: Estimated by the authors

Table C2. Correlation Coefficients Between Indicator Variables and Mean Household Income by State, 1990

Variable	Correlation Coefficient	Significance Level
Family (F90)		
Households Headed by Single Female with Children (F90/HHSFC)	.0268	.853
Rate of Births from Single Teens (F90/BRST)	-.4135	.003
Infant Mortality Rates (F90/IMR)	-.1323	.360
Education (E90)		
High School Graduation Rates (E90/HSGR)	-.0365	.801
Teens not in School (E90/TNIS)	-.1053	.467
Crime (C90)		
Litigation Rates (C90/LIT)	-.2203	.124
Violent Death Rates for Teens (C90/VDT)	-.4436	.001
Labor (L90)		
Labor Force Participation Rates (L90/LFPR)	.5764	.000
Poverty Rates for Children (L90/CPR)	-.4620	.001

Source: Estimated by the authors

Table C3. Rotated Factor Matrix of Indicator Variables for States, 1990

Variables	Factor 1 (Education)	Factor 2 (Family)	Factor 3 (Labor)	Factor 4 (Crime)
Education (E90)				
E90/HSGR	**-.8561**	-.3236	-.0971	-.0708
E90/TNIS	**.7646**	.0268	.2648	.4149
Family (F90)				
F90/IMR	.1318	**.8894**	.1070	.2918
F90/BRST	.2758	**.6594**	.4795	.3492
F90/HHSFC	.5289	**.6268**	.3161	.0086
Labor (L90)				
L90/LFPR	-.0792	-.1250	**-.9524**	-.1268
L90/CPR	.4296	.2957	**.6838**	.3564
Crime (C90)				
C90/VDT	.0712	.1383	.1404	**.8994**
C90/LIT	.2407	.3283	.2143	**.6049**

Cumulation percentage of variance for the four factors equals 83.5.

Table C4. Regression Analysis to Predict Coefficients of Variation for States, 1990

Independent Variable	Beta	T-Statistic	Significance
Factor 1 (Education)	.013685	2.410	.0202
Factor 2 (Family)	.009545	1.712	.0939
Factor 3 (Labor)	.036230	6.210	.0000
Factor 4 (Crime)	.024581	4.398	.0001
T90/H (Health Transfer)	-2.04930E-04	-1.959	.0564
Constant	1.034320	55.672	.0000
Adj R^2	.61948		
F-Statistic	16.95448		.0000

Source: Estimated by the authors

Table C5. Regression Analysis to Predict Mean Household Income for States, 1990

Independent Variable	Beta	T-Statistic	Significance
Factor 1 (Education)	953.503	1.661	.104
Factor 2 (Family)	-147.225	-.261	.795
Factor 3 (Labor)	-2949.375	-5.000	.000
Factor 4 (Crime)	-2043.523	-3.616	.001
T90/H (Health Transfer)	29.929	2.830	.007
(Constant)	26123.647	13.907	.000
Adj R^2	0.568		
F-Statistic	13.883		.000

Source: Estimated by the authors

Table C6. Coefficients of Variation in Descending Order and Mean Household Incomes by State, 1990

State	Coefficient of Variation	Mean ($)	Standard Deviation ($)
Louisiana	1.14680	24,685.20	28,309.10
Florida	1.11346	29,198.36	32,511.08
Arizona	1.10437	28,095.19	31,027.36
Oklahoma	1.09976	25,295.50	27,818.93
Mississippi	1.09936	23,494.57	25,829.09
Texas	1.09316	29,544.71	32,297.14
Arkansas	1.08324	23,662.03	25,631.54
West Virginia	1.07543	23,083.16	24,824.39
New Mexico	1.06145	25,626.48	27,201.14
Alabama	1.05617	26,660.69	28,158.15
Maine	1.05337	25,934.26	27,318.37
New York	1.04383	38,640.20	40,333.75
Idaho	1.04358	26,744.90	27,910.51
Kentucky	1.03860	26,216.66	27,228.68
Tennessee	1.03669	28,296.34	29,334.50
Vermont	1.03311	26,628.33	27,510.08
Georgia	1.02783	31,948.28	32,837.38
Montana	1.02708	23,492.22	24,128.42
North Dakota	1.02080	24,639.44	25,152.01
Missouri	1.02066	28,913.93	29,511.36
South Carolina	1.00911	27,698.94	27,951.41
North Carolina	1.00560	28,886.45	29,048.35
Pennsylvania	1.00208	32,242.97	32,310.05
Wyoming	1.00144	26,176.89	26,214.66
Colorado	0.99680	31,441.86	31,341.28
Kansas	0.99353	30,070.70	29,876.24
Nevada	0.98639	33,406.04	32,951.49
Michigan	0.98505	33,010.67	32,517.16
Nebraska	0.97294	28,384.98	27,616.83
Illinois	0.96993	36,514.68	35,416.72
South Dakota	0.96767	23,953.19	23,178.68
Delaware	0.96662	34,528.36	33,375.85
Minnesota	0.96472	32,736.85	31,582.05

Table C6. Coefficients of Variation in Descending Order and Mean Household Incomes by State, 1990 (cont.)

State	Coefficient of Variation	Mean ($)	Standard Deviation ($)
California	0.95898	40,958.99	39,279.01
Alaska	0.94956	39,065.86	37,095.44
New Jersey	0.94953	44,566.43	42,317.13
Ohio	0.94894	32,078.45	30,440.46
New Hampshire	0.94716	33,709.38	31,928.28
Wisconsin	0.94710	30,616.95	28,997.44
Massachusetts	0.94637	39,959.38	37,816.55
Oregon	0.94603	30,699.03	29,042.18
Rhode Island	0.94458	34,682.38	32,760.31
Connecticut	0.93719	46,950.29	44,001.12
Iowa	0.93219	29,137.47	27,161.71
Indiana	0.92986	31,214.10	29,024.89
Virginia	0.92821	37,047.50	34,388.01
Washington	0.91118	33,937.52	30,923.10
Utah	0.90398	30,614.17	27,674.74
Hawaii	0.89995	42,325.21	38,090.69
Maryland	0.89492	42,821.59	38,322.11

Source: Data used to calculate values in other columns were obtained from U.S. Department of Commerce, Bureau of the Census, 1990 Census of Population and Housing, Public Use Microdata Sample (PUMS), CD90AA, August 1993.

Table C7. Mean Household Incomes in Descending Order and Coefficients of Variation by State, 1990

State	Mean ($)	Standard Deviation ($)	Coefficient of Variation
Connecticut	46,950.29	44,001.12	0.93719
New Jersey	44,566.43	42,317.13	0.94953
Maryland	42,821.59	38,322.11	0.89492
Hawaii	42,325.21	38,090.69	0.89995
California	40,958.99	39,279.01	0.95898
Massachusett	39,959.38	37,816.55	0.94637
Alaska	39,065.86	37,095.44	0.94956
New York	38,640.20	40,333.75	1.04383
Virginia	37,047.50	34,388.01	0.92821
Illinois	36,514.68	35,416.72	0.96993
Rhode Island	34,682.38	32,760.31	0.94458
Delaware	34,528.36	33,375.85	0.96662
Washington	33,937.52	30,923.10	0.91118
New Hampshire	33,709.38	31,928.28	0.94716
Nevada	33,406.04	32,951.49	0.98639
Michigan	33,010.67	32,517.16	0.98505
Minnesota	32,736.85	31,582.05	0.96472
Pennsylvania	32,242.97	32,310.05	1.00208
Ohio	32,078.45	30,440.46	0.94894
Georgia	31,948.28	32,837.38	1.02783
Colorado	31,441.86	31,341.28	0.99680
Indiana	31,214.10	29,024.89	0.92986
Oregon	30,699.03	29,042.18	0.94603
Wisconsin	30,616.95	28,997.44	0.94710
Utah	30,514.17	27,674.74	0.90398
Kansas	30,070.70	29,876.24	0.99353
Texas	29,544.71	32,297.14	1.09316
Florida	29,198.36	32,511.08	1.11346
Iowa	29,137.47	27,161.71	0.93219
Missouri	28,913.93	29,511.36	1.02066
North Carolina	28,886.45	29,048.35	1.00560
Nebraska	28,384.98	27,616.83	0.97294
Tennessee	28,296.34	29,334.55	1.03669

Table C7. Mean Household Incomes in Descending Order and Coefficients of Variation by State, 1990 (cont.)

State	Mean ($)	Standard Deviation ($)	Coefficient of Variation
Arizona	28,095.19	31,027.36	1.10437
South Carolina	27,698.94	27,951.41	1.00911
Idaho	26,744.90	27,910.51	1.04358
Alabama	26,660.69	28,158.15	1.05617
Vermont	26,628.33	27,510.08	1.03311
Kentucky	26,216.66	27,228.68	1.03860
Wyoming	26,176.89	26,214.66	1.00144
Maine	25,934.26	27,318.37	1.05337
New Mexico	25,626.48	27,201.14	1.06145
Oklahoma	25,295.50	27,818.93	1.09976
Louisiana	24,685.20	28,309.10	1.14680
North Dakota	24,639.44	25,152.01	1.02080
South Dakota	23,953.19	23,178.68	0.96767
Arkansas	23,662.03	25,631.54	1.08324
Mississippi	23,494.57	25,829.09	1.09936
Montana	23,492.22	24,128.42	1.02708
West Virginia	23,083.16	24,824.39	1.07543

Source: Same as Table C6.

Table C8. Regression Analysis of Mean Household Incomes on Coefficients of Variation by State, 1990

Independent Variable	Beta	T-Statistic	Significance Level
Constant	95602.416	7.803	.000
Coefficient of Variation	-65616.982	-5.363	.000
Adjusted R^2	0.362		
F-Statistic	28.765		.000

Source: Estimated by the authors

Appendix D

Social Capital Indicator Variables and Income Distributions for the U.S., 1980

Table D1. Correlation Coefficients Between Indicator Variables and Coefficients of Variation by State, 1980

Variable	Correlation Coefficient	Significance Level
Family (F80)		
Households Headed by Single Female with Children (F80/HHSFC)	-.0441	.761
Rate of Births from Single Teens (F80/BRST)	.7008	.000
Infant Mortality Rates (F80/IMR)	.5480	.000
Education (E80)		
High School Graduation Rates (E80/HSGR)	-.7245	.000
Teens not in School (E80/TNIS)	.5055	.000
Crime (C80)		
Litigation (C80/LIT)	.3884	.005
Violent Death Rates for Teens (C80/VDT)	.1750	.224
Labor (L80)		
Labor Force Participation Rates (L80/LFPR)	-.6716	.000
Poverty Rates for Children (L80/CPR)	.8579	.000

Source: Estimated by the authors

Table D2. Correlation Coefficients Between Indicator Variables and Mean Household Income by State, 1980

Variable	Correlation Coefficient	Significance Level
Family (F80)		
Households Headed by Single Female with Children (F80/HHSFC)	.5454	.000
Rate of Births from Single Teens (F80/BRST)	-.4948	.000
Infant Mortality Rates (F80/IMR)	-.1984	.167
Education (E80)		
High School Graduation Rates (E80/HSGR)	.5948	.000
Teens not in School (E80/TNIS)	-.2782	.050
Crime (C80)		
Litigation (C80/LIT)	.0120	.934
Violent Death Rates for Teens (C80/VDT)	.0356	.806
Labor (L80)		
Labor Force Participation Rates (L80/LFPR)	.6871	.000
Poverty Rates for Children (L80/CPR)	-.5798	.000

Source: Estimated by the authors

Table D3. Rotated Factor Matrix of Indicator Variables for States, 1980

Variables	Factor 1 (Labor/Educ.)	Factor 2 (Educ./Family)	Factor 3 (Family)	Factor 4 (Crime)
Labor (L80)/Education (E80)				
LFPR	**-.87708**	-.23302	.19077	-.01254
HSGR	**-.67739**	**-.57950**	-.20207	.22666
CPR	**.67622**	.52716	.28726	.13313
Education (E80)/Family (F80)				
TNIS	.10869	**.84615**	.08316	.39923
BRST	.50492	**.76614**	.16445	.21639
Family (F80)				
HHSFC	-.23038	.04698	**.89485**	.17802
IMR	.48537	.44383	**.60159**	-.06742
Crime (C80)				
VDT	-.14178	.20633	.05573	**.90068**
LIT	.41569	.01750	.53321	**.62952**

Cumulation percentage of variance for the four factors equals 86.8.

Source: Estimated by the authors

Table D4. Regression Analysis to Predict Coefficients of Variation for States, 1980

Independent Variable	Beta	T-Statistic	Significance
Factor 1 (Labor/Education)	.030693	9.653	.0000
Factor 2 (Education/Family)	.023265	6.755	.0000
Factor 3 (Family)	.001138	.365	.7167
Factor 4 (Crime)	.008941	2.796	.0076
T80/H	1.05960E-04	2.762	.0083
(Constant)	.673225	24.999	.0000
Adj R^2	.72856		
F-Statistic	27.30409		.0000

Source: Estimated by the authors

Table D5. Regression Analysis to Predict Mean Household Income by States, 1980

Independent Variable	Beta	T-Statistic	Significance
Factor 1 (Labor/Education)	-1623.670	-7.892	.000
Factor 2 (Education/Family)	-821.382	-3.685	.001
Factor 3 (Family)	1100.546	5.456	.000
Factor 4 (Crime)	162.263	.784	.437
T80/H	2.522	1.016	.315
(Constant)	17444.218	10.01	.000
Adj R^2	.717		
F-Statistic	25.820		.000

Source: Estimated by the authors

Table D6. Coefficients of Variation in Descending Order and Mean Household Incomes by State, 1980

State	Coefficient of Variation	Mean ($)	Standard Deviation ($)
Mississippi	0.84486	15,051.39	12,716.31
Arkansas	0.82561	14,956.46	12,348.17
Louisiana	0.81903	17,958.07	14,708.27
Alabama	0.81179	16,599.88	13,475.54
Florida	0.80842	18,017.00	14,565.24
Kentucky	0.80700	16,638.07	13,426.96
Tennessee	0.80041	16,875.31	13,507.24
Georgia	0.79775	17,971.36	14,336.62
Oklahoma	0.79232	19,642.10	13,978.15
South Dakota	0.78325	15,793.57	12,370.37
New York	0.78076	19,780.19	15,443.63
Rhode Island	0.77326	17,565.20	13,582.46
West Virginia	0.77097	16,739.84	12,905.90
South Carolina	0.76979	17,145.57	13,198.55
Texas	0.76747	19,772.89	15,175.11
New Mexico	0.76537	17,308.64	13,247.51
North Dakota	0.76493	16,071.68	12,293.67
Nebraska	0.76451	17,827.39	13,629.13
Missouri	0.76348	18,276.32	13,853.53
Montana	0.76231	17,486.44	13,330.01
North Carolina	0.76140	16,753.05	12,755.80
Kansas	0.74871	18,991.08	14,218.76
California	0.74733	21,528.72	16,089.00
Idaho	0.74623	17,759.74	13,252.88
Delaware	0.74364	20,690.29	15,386.20
Arizona	0.73869	19,292.59	14,251.17
Nevada	0.73330	20,845.14	15,285.76
Virginia	0.73274	20,580.44	15,080.05
Massachusetts	0.73130	20,287.21	14,835.96
Maine	0.73088	15,958.13	11,663.40

Table D6. Coefficients of Variation in Descending Order and Mean Household Incomes by State, 1980 (cont.)

State	Coefficient of Variation	Mean ($)	Standard Deviation ($)
Iowa	0.72987	19,009.19	13,874.19
Minnesota	0.72928	20,143.52	14,690.36
Oregon	0.72884	19,320.03	14,081.20
Pennsylvania	0.72827	19,233.31	14,007.12
Colorado	0.72463	21,046.37	15,250.80
Illinois	0.72157	21,830.70	15,752.33
Vermont	0.71851	17,088.57	12,278.33
Connecticut	0.71703	23,056.26	16,532.07
New Jersey	0.71467	22,512.20	16,088.73
Ohio	0.71102	19,937.08	14,175.57
Michigan	0.70921	21,546.55	15,281.00
Washington	0.70919	20,863.66	14,796.23
Hawaii	0.70330	23,585.46	16,587.71
Indiana	0.70261	19,730.91	13,863.10
Maryland	0.69889	23,085.55	16,134.37
Wisconsin	0.69340	19,939.43	13,825.94
New Hampshire	0.68686	19,242.23	13,216.74
Utah	0.68301	19,907.37	13,596.91
Wyoming	0.68176	21,619.59	14,739.34
Alaska	0.67784	29,304.99	19,864.09

Source: Same as Table C6, but for 1980.

Table D7. Mean Household Incomes in Descending Order and Coefficients of Variation by State, 1980

State	Mean ($)	Standard Deviation ($)	Coefficient of Variation
Alaska	29,304.99	19,864.09	0.67784
Hawaii	23,585.46	16,587.71	0.70330
Maryland	23,085.55	16,134.37	0.69889
Connecticut	23,056.26	16,532.07	0.71703
New Jersey	22,512.20	16,088.73	0.71467
Illinois	21,830.70	15,752.33	0.72157
Wyoming	21,619.59	14,739.34	0.68176
Michigan	21,546.55	15,281.00	0.70921
California	21,528.72	16,089.00	0.74733
Colorado	21,046.37	15,250.80	0.72463
Washington	20,863.66	14,796.23	0.70919
Nevada	20,845.14	15,285.76	0.73330
Delaware	20,690.29	15,386.20	0.74364
Virginia	20,580.44	15,080.05	0.73274
Massachusetts	20,287.21	14,835.96	0.73130
Minnesota	20,143.52	14,690.36	0.72928
Wisconsin	19,939.43	13,825.94	0.69340
Ohio	19,937.08	14,175.57	0.71102
Utah	19,907.37	13,596.91	0.68301
New York	19,780.19	15,443.63	0.78076
Texas	19,772.89	15,175.11	0.76747
Indiana	19,730.91	13,863.10	0.70261
Oklahoma	19,642.10	13,978.15	0.79232
Oregon	19,320.03	14,081.20	0.72884
Arizona	19,292.59	14,251.17	0.73869
New Hampshire	19,242.23	13,216.74	0.68686
Pennsylvania	19,233.31	14,007.12	0.72827
Iowa	19,009.19	13,874.19	0.72987
Kansas	18,991.08	14,218.76	0.74871
Missouri	18,276.32	13,953.53	0.76348
Florida	18,017.00	14,565.24	0.80842
Georgia	17,971.36	14,336.62	0.79775
Louisiana	17,958.07	14,708.27	0.81903

Table D7. Mean Household Incomes in Descending Order and Coefficients of Variation by State, 1980 (cont.)

State	Mean ($)	Standard Deviation ($)	Coefficient of Variation
Nebraska	17,827.39	13,629.13	0.76451
Idaho	17,759.74	13,252.88	0.74623
Rhode Island	17,565.20	13,582.46	0.77326
Montana	17,486.44	13,330.01	0.76231
New Mexico	17,308.64	13,247.51	0.76537
South Carolina	17,145.57	13,198.55	0.76979
Vermont	17,088.57	12,278.33	0.71851
Tennessee	16,875.31	13,507.24	0.80041
North Carolina	16,753.05	12,755.80	0.76140
West Virginia	16,739.84	12,905.90	0.77097
Kentucky	16,638.07	13,426.96	0.80700
Alabama	16,599.88	13,475.54	0.81179
North Dakota	16,071.68	12,293.67	0.76493
Maine	15,958.13	11,663.40	0.73088
South Dakota	15,793.57	12,370.37	0.78325
Mississippi	15,051.39	12,716.31	0.84486
Arkansas	14,956.46	12,348.17	0.82561

Source: Same as Table C6, but for 1980

Table D8. Regression Analysis of Mean Household Incomes on Coefficients of Variation by State, 1980

Independent Variable	Beta	T-Statistic	Significance Level
Constant	43,917.71	10.942	.000
Coefficient of Variation	-34,026.80	-6.343	.000
Adjusted R2	.445		
F-Statistic	40.238		.000

Source: Estimated by the authors

APPENDIX E
U.S. Income Distribution Changes Between 1980 and 1990

Table E1. Increase in Mean Household Incomes and Coefficients of Variation (CV) by State in Descending Order, 1980 to 1990

State	Ratios of Mean Income 1990/1980	Ratios of CV 1990/1980	CV 1990	CV 1980	Mean Income ($) 1990	Mean Income ($) 1980*
Connecticut	1.28071	1.30704	0.93719	0.71703	46,950.29	36,659.45
New Jersey	1.24507	1.32863	0.94953	0.71467	44,566.43	35,794.40
Rhode Island	1.24182	1.22156	0.94458	0.77326	34,682.38	27,928.67
Massachusetts	1.23879	1.29409	0.94637	0.73130	39,959.38	32,256.66
New York	1.22860	1.33694	1.04383	0.78076	38,640.20	31,450.50
California	1.19656	1.28321	0.95898	0.74733	40,958.99	34,230.66
Maryland	1.16661	1.28049	0.89492	0.69889	42,821.59	36,706.02
Virginia	1.13216	1.26677	0.92821	0.73274	37,047.50	32,722.90
Hawaii	1.12865	1.27961	0.89995	0.70330	42,325.21	37,500.88
Georgia	1.11807	1.28841	1.02783	0.79775	31,948.28	28,574.46
N. Hampshire	1.10179	1.37897	0.94716	0.68686	33,709.38	30,595.15
Alabama	1.10110	1.30104	1.05617	0.81179	26,660.69	26,393.81
North Carolina	1.08443	1.32072	1.00560	0.76140	28,886.45	26,637.35
Tennessee	1.05458	1.29520	1.03669	0.80041	28,296.34	26,831.74
Pennsylvania	1.05435	1.37597	1.00208	0.72827	32,242.97	30,580.96
Illinois	1.05197	1.34419	0.96993	0.72157	36,514.68	34,710.81
Delaware	1.04957	1.29985	0.96662	0.74364	34,528.36	32,897.56
Washington	1.02304	1.28482	0.91118	0.70919	33,937.52	33,173.22
Minnesota	1.02213	1.32284	0.96472	0.72928	32,736.85	32,028.20
Maine	1.02210	1.44124	1.05337	0.73088	25,934.26	25,373.43
Florida	1.01925	1.37733	1.11346	0.80842	29,198.36	28,647.03
South Carolina	1.01605	1.31089	1.00911	0.76979	27,698.94	27,261.46
Ohio	1.01194	1.33462	0.94894	0.71102	32,078.45	31,699.96
Nevada	1.00791	1.34514	0.98639	0.73330	33,406.04	33,143.77
Nebraska	1.00139	1.27263	0.97294	0.76451	28,384.98	28,345.55
Oregon	0.99935	1.29799	0.94603	0.72884	30,699.03	30,718.85
Kansas	0.99586	1.32699	0.99353	0.74871	30,070.70	30,195.82
Arkansas	0.99501	1.31205	1.08324	0.82561	23,662.03	23,780.77
Missouri	0.99500	1.33685	1.02066	0.76348	28,913.93	29,059.35
Indiana	0.99496	1.32216	0.92896	0.70261	31,214.10	31,372.15
Kentucky	0.99101	1.28699	1.03860	0.80700	26,216.66	26,454.53
Mississippi	0.98173	1.30123	1.09936	0.84486	23,494.57	23,931.71
Vermont	0.98003	1.43785	1.03311	0.71851	26,628.33	27,170.83

Table E1. Increase in Mean Household Incomes and Coefficients of Variation (CV) by State in Descending Order, 1980 to 1990 (cont.)

State	Ratios of Mean Income 1990/1980	Ratios of CV 1990/1980	CV 1990	CV 1980	Mean Income ($) 1990	Mean Income ($) 1980*
Utah	0.96719	1.32352	0.90398	0.68301	30,614.17	31,652.72
Wisconsin	0.96572	1.36588	0.94710	0.69340	30,616.95	31,703.69
North Dakota	0.96421	1.33450	1.02080	0.76493	24,639.44	25,553.97
Iowa	0.96403	1.27720	0.93219	0.72987	29,137.47	30,224.61
Michigan	0.96356	1.38894	0.98505	0.70921	33,010.67	34,259.01
South Dakota	0.95386	1.23545	0.96767	0.78325	23,953.19	25,111.78
Idaho	0.94712	1.39847	1.04358	0.74623	26,744.90	28,237.99
Texas	0.93975	1.42437	1.09316	0.76747	29,544.71	31,438.90
Colorado	0.93958	1.37560	0.99680	0.72463	31,441.86	33,463.73
New Mexico	0.93117	1.38685	1.06145	0.76537	25,626.48	27,520.74
Arizona	0.91589	1.49504	1.10437	0.73869	28,095.19	30,675.22
Oklahoma	0.90177	1.38803	1.09976	0.79232	25,295.50	28,050.94
West Virginia	0.86726	1.39491	1.07543	0.77097	23,083.16	26,616.35
Louisiana	0.86453	1.40019	1.14680	0.81903	24,685.20	28,553.33
Montana	0.84494	1.34733	1.02708	0.76231	23,492.22	27,803.44
Alaska	0.83841	1.40086	0.94956	0.67784	39,065.86	46,594.93
Wyoming	0.76151	1.46890	1.00144	0.68176	26,176.89	34,375.15

** 1990 Constant dollars.*

Source: Estimated by the authors

Table E2. Increase in Mean Household Incomes and Coefficients of Variation in the United States by Race/Ethnic Group: 1980-1990

Race/Ethnic Group	Ratio of Mean Income	Ratio of CV	CV 1990	CV 1980	Mean Income ($) 1990	Mean Income ($) 1980*
Total Population	1.03065	1.0770	0.81476	0.75650	36,574.71	35,487.04
White	1.02976	1.0804	0.79494	0.73582	38,012.20	36,913.53
African American	0.97741	1.0371	0.90154	0.86929	24,667.12	25,237.18
Native American	1.11144	1.0253	0.82344	0.80313	27,910.16	25,111.61
Asian	1.08345	1.0150	0.75552	0.74434	44,667.65	41,227.37
Hispanic	0.95153	1.0641	0.83340	0.78320	27,760.34	29,174.33

** 1990 Constant dollars.*

Note: Data for 1980 was extracted from PUMS 1980, for 1990 was extracted from CPS 1990/1991.

Source: Estimated by the authors

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