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Searching for the Supposed Benefits of Higher Inequality: Impacts of Rising Top Shares on the Standard of Living of Low and Middle-Income Families

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**The views expressed in this paper are those of the authors and should not be interpreted as those of the Congressional Budget Office or the University of Massachusetts.

Abstract

This paper uses US state panel data to explore the relationship between the share of income held by affluent households and the level of income received by low and middle-income households. A rising top share of income can potentially lead to increases in the incomes of low and middle-income households if economic growth is sufficiently responsive to increases in inequality. A substantial literature on the impacts of inequality on economic growth exists, but has failed to achieve consensus, with various studies finding positive impacts, negative impacts, and no impacts on growth from increased levels of income inequality. This paper departs from that literature by exploring the effect of inequality on the standard of living of middle-income and low-income households. In the context of rising inequality, increased overall growth is not necessarily a suitable proxy for standard of living, since growth patterns are not always uniform for the entire income distribution. The results of this study indicate that increases in the top share of income (whether of the top 10 percent or top one percent) lead to declines in the actual incomes (and earnings) of low and middle income households.

1. Introduction

Rising levels of inequality in wages, income, and wealth have been well-documented for many years now.[i] Increasingly, the research on the topic of inequality has turned from documenting levels and trends in the distribution of income to examining the economic and social impacts of inequality. The burgeoning literature investigating the impacts of this increased disparity on health and economic growth are two examples.[ii] This is an important direction for research because normative concerns over greater inequality are not universally shared.

Commonly "too much" inequality or rising levels of inequality are considered unfair because they violate widely shared values related to the distribution of wealth and appropriate rewards for hard work.[iii] Other arguments, however, suggest that increased inequality is good for society, as it offers larger incentives to entrepreneurs and investors, creating increased economic growth, which will generate benefits for everyone.[iv] Those sentiments are at the core of arguments behind "trickle-down" economic policy. In this study, we empirically test one key component of those claims – whether or not greater inequality raises the standard of living of non-affluent households. Using state-level data on income levels and the distribution of income, the paper examines the impacts of increases in the share of income going to the top 10% and top 1% of the distribution since the late 1970s on the actual incomes of middle and low-income households.

The findings indicate that household income at the bottom and in the middle of the distribution does not rise following increases in the share of income held by affluent households. Instead, the income of low and middle-income households falls, particularly if we allow inequality of have a lagged effect over many years. These findings are *consistent* even with research showing higher inequality leads to greater overall economic growth. The empirical literature on the impacts of inequality on economic growth remains in conflict, with some studies findings negative effects and others findings positive effects. Even in some studies finding positive impacts, the size of the growth effect is sufficiently weak that it does not make up for the lost income of middle and low-income families from the initial shift in the distribution. Total income will growth slightly faster, but not fast enough to return non-affluent income levels back to their pre-inequality levels.

The paper proceeds by giving a brief motivation for the importance of using state-level data to investigate the relationship between inequality and standards of living at different places in the income distribution. It then reviews the related literature on the impacts of inequality on economic growth, and presents arguments and some evidence as to why these findings do not indicate the impacts on standard of living. Then the paper describes the empirical model and the data used in the analysis. Finally, we present the findings of the panel data regressions and discuss some potential explanation for these findings and areas for future research.

2. Motivation for using state panel data to study inequality

One obvious response to claims that rising inequality leads to a higher standard of living is to point out that median family income has grown very slowly since inequality started to rapidly increase in the 1980s **(See Figure 1, A)**. Prior to the late 1970s, inequality was flat, but family incomes consistently rose. Since the late 1970s inequality has soared, but median family incomes have stagnated. From this perspective, it is difficult to support the idea that rising inequality leads to higher incomes and economic growth.

Focusing on broad averages in a "pre and post-1970s" framework, however, conceals as much as it reveals. First, the pattern of changes in both inequality and median family income are decidedly more nuanced if we examine the entire series **(See Figure 1, A-C)**. The post-war period of median family income growth faltered at the end of the 1960s, and inequality did not begin its rapid ascent until the beginning of the early 1980s. If we focus on the period since the early 1980s, we will see that both median family income and top income shares do indeed rise and fall together. It is far from certain, though, that this relationship is causal. Each of the variables is highly cyclical; median family income and the top-income share both rise in expansions and fall in recessions, regardless of any potential causal relationship between the two.

This latter concern, the influence of "omitted" factors (business cycles being just one example) on each of the series is another fundamental reason why the national trends in income levels and inequality cannot resolve the question – either rejecting or affirming the presence of benefits of inequality.

To avoid these difficulties, this paper uses state-level data to explore the impacts of rising inequality on the level of income for low and middle-income families. Using panel data for the 50 states from the late 1970s until the late 2000s, we can identify the impact of inequality on standards of living at different points in the income distribution while also accounting for the influence of both omitted factors shared across all states and state-specific idiosyncratic factors. In addition, we can explore possible time lags in the relationship. Inequality has risen in all states, but as **Figure 2** – which includes the top 10 percent income share for each of the New England states – indicates, it has not increased at the same rate in every state. In 1960, the top 10 percent share of income was 30 percent in Rhode Island and 31 percent in Connecticut. By 2005 the top 10 percent share was 42 percent in Rhode Island and 53 percent in Connecticut.

Using the variation in inequality over time across states will help us identify the relationship between increases in top income shares and the level of income among non-affluent households. The regression analysis explores whether states with above average increases in inequality also experience above average increases in family incomes, including a host of controls for relevant economic factors, such as the unemployment rate, hours worked, and industrial composition.

3. Review of related literature on inequality and growth

A substantial body of work on the impacts of inequality on economic growth has evolved over the last 15 years, and this literature has developed approaches to dealing with the common problems faced when trying to identify the impacts of inequality on the standard of living of low and middle-income households. This literature initially used international data, cross-sectional analysis, and broad measures of inequality. Increasingly that literature is using US state-level data, panel data methods, and inequality measures focused specifically on the very top of the distribution.

3a. Theoretical perspectives

A number of different bodies of economic theory address the impact of inequality on growth.[v] These theories suggest that there may be both positive and negative impacts of inequality on growth. In addition, inequality may have disparate effects through multiple channels on various portions of the distribution.

The standard neoclassical economic approach associates inequality with incentives – some level of inequality is required to provide incentives for labor, leading to a trade-off between equity and growth (Arthur Okun, 1975). Nicholas Kaldor (1956) suggests that inequality creates incentives for the more productive use of resources; inequality has also been associated with innovation, risk-taking, and entrepreneurship (Voitchovsky, 2005). The standard Keynsian notion of a declining marginal propensity to consume suggests that high-income households save more, and that redistribution from the rich to the poor will reduce savings and investment.

At the same time, however, high inequality is thought to limit domestic demand, reducing the potential for industrialization and growth (Kevin Murphy, Robert Schliefer, and Andrei Vishny, 1989). Of course, to the extent growth is a function of consumer demand and/or of the increased prosperity of laborers, and/or to the extent the rich spend substantial sums on luxury goods or invest in secondary and unproductive or non-entrepreneurial activities, redistribution from rich to poor will tend to increase growth.[vi]

In part because of the theoretically ambiguous relationship between inequality and growth, as well as the potentially powerful political implications of the existence of such a relationship, a rapidly expanding empirical literature on the question has emerged.

3b. Empirical Findings

Empirical analysis of these theoretical discussions has failed to achieve consensus on either the direction or the magnitude of the impacts of inequality on growth. Empirical examinations of the theories that link inequality and growth have been conducted using data from a number of different countries and over various time periods. Data on inequality are often available only intermittently or only for recent years, and the data are frequently of questionable quality, even in the supposedly "high quality" data sets. The frequency and quality of data often have a marked impact on empirical results, as do the selected measure of inequality and the empirical model tested.

Cross-Country Studies on Inequality and Growth

Numerous cross-country studies have been conducted in an attempt to determine empirically the effect of inequality on growth. These studies typically regress per capita income growth on the Gini coefficient. Studies that use pooled OLS techniques have generally found a negative effect, while panel estimation techniques have generally yielded a positive effect. Although panel estimators are better suited to working with cross-country data of this nature, the data they use have been suggested to be little better than the data sets used in pooled cross-sectional studies (Atkinson and Brandolini, 2001). In addition, panel studies such as the one performed by Barro (2000) have found that the relationship between inequality and growth is not robust to the use of different control variables. Banerjee and Duflo (2003), using Deininger and Squire's (1998) data, find little relationship between inequality and growth, and suggest that the relationship between inequality and growth is non-linear. Sarah Voitchovsky (2005) uses various inequality measures sensitive to different parts of the income and obtains similar results.

Most recently, Andrews, Jencks, and Leigh (2010) use panel data methods and test the impact of rising top income shares on growth in 12 developed countries. Their results indicate that increasing inequality does lead to subsequent increases in growth in the period after 1960 -- a 1 point rise in the top 10% income share every year for five years increases average annual growth by 0.121 percentage points. Over a longer time span from 1905 to 2000, there appears to be no relationship.

Appendix Table 1 summarizes a number of the most important studies -- the authors, data sets, statistical techniques, and conclusions about the connections between inequality and growth. The table illustrates the wide variety of data sets and statistical techniques that have been used. Even examination of the same data set -- in recent years, Deininger and Squire's data -- rarely leads to the same conclusions about the relationship between inequality and growth. There is no consensus that increased inequality leads to more growth or, therefore, that the mechanism of increased growth will mediate any increase in top income shares by increasing the absolute income of the lower portion of the income distribution.

Studies of Inequality and Growth in the United States

Ravi Kanbur (2000), Banerjee and Duflo (2003), and Atkinson *et al.* (2007) have all suggested that a new emphasis on case studies of individual countries is desirable for gaining a deeper understanding of the connections between inequality and growth. The United States is an ideal setting for this research, since

it has some of the world's most reliable inequality data available over a long contiguous time period -- most of the 20th century. Combining the number of states, the length of time for which data are now available, and the number of available economic variables, state level analysis provides a very high number of observations compared to cross-country studies with decadal observations, and this increases the accuracy of parameter estimates.

Partridge (1997) argues that state-level data may be more desirable as a medium for examining the inequality-growth relationship than cross-country data, because states are more similar than countries, resulting in more stable coefficient estimates and less impact of outliers. Partridge (2004) suggests additional advantages to using state data: since states are open economies and have close ties in their economic systems, there will be large flows in factors of production between states, serving to "magnify how small disparities in initial conditions affect economic growth. . . Hence, any income-distribution/growth relationship should be much easier to detect using states." Frank (2009) notes that the superior data availability in the U.S. reduces the possibility of omitted variable bias.

As in the cross-country literature, the studies of inequality and growth in the United States do not reach a consensus on the link between inequality and growth. Partridge (1997, 2004) and Panizza (2002) use panels with decadal observations, and come to conflicting conclusions about the impact of inequality. Frank (2009) is the first to use a panel with yearly measurements of inequality; his data show a positive effect of inequality on growth. Appendix Table 2 summarizes these studies.[vii]

One weakness of many of these studies reviewed above – both the international research and the US-focused research – stems from the measure of inequality used. Most of these papers use inequality measures such as the Gini index, which understate the dramatic shifts that have taken place at the top of the distribution. Recent research suggests that most of the changes in inequality over the last three decades have been driven by chances at the very top of the income distribution – just the few highest percentiles – rendering broad measures of the entire income distribution like the Gini index ineffectual (Smeeding and Thompson, 2011; Burkhauser et al, 2009).

4. Extending the existing literature and focusing on Incomes, not growth

Research on the growth impacts of inequality remains in conflict, but even those studies that find a positive relationship do not necessarily imply that living standards for low or middle-income households will improve. When the distribution of income is becoming more concentrated at the top, the incomes of non-affluent households will only rise if the growth effect outweighs the distributional effect. One growth study to address this issue directly is Andrews, Jencks, and Leigh (2010). Their results indicate that greater inequality does lead to subsequent increases in economic growth, and they extrapolate from those findings to consider whether increased growth will lead to higher incomes at the bottom of the distribution. Their "back of the envelope" calculations suggest it takes 13 years for the bottom 9 deciles to break even -- to reach the point where their decreasing share of total income is counterbalanced by growth in total income. The authors, however, note that their work fails to account for any changes that may occur in the distribution of the bottom nine deciles and for various causes of rising inequality, which are likely to have different impacts. They conclude that "The claim that inequality at the top of the distribution either benefits or harms everyone therefore depends on long-term effects that we cannot estimate very precisely even with these data" (30). The impact of rising top income shares on growth of lower- and middle-incomes remains unclear.

Kenworthy (2010) addresses the question directly by exploring the relationship between rising top income shares and the level of income of households at the bottom of the distribution in the United State and 13 other rich countries. He concludes that increasing inequality neither helped nor hurt the incomes of poor households. The basic finding of "no impact," however, depends on two countries being dropped from the analysis on account of being outliers.[viii] For the few cases where low-incomes have risen along with inequality, Kenworthy shows it was actually the result of increased government transfer payments that arguably are a political response to rising top shares.

None of the state-level studies of the relationship between inequality and economic growth have explored the implicit impacts on incomes of households further down the distribution. We can, however, use the findings of Frank (2009), which uses high-income shares as its measure of inequality to carry out similar "back of the envelope" calculations as Andrews, Jencks, and Leigh (2010). Frank (2009) concludes that higher levels of inequality boost economic growth, but our calculations show that impact on low and middle-income levels, using reasonable accounting periods and discount rates, is negative. The small positive impact of rising inequality on economic growth is not sufficiently large to make up for the lost income at the bottom due to the initial shift in the distribution.

Using Frank's findings as a baseline, we conduct simulations to see how long it would take the resulting boost in economic growth to produce income increases sufficient to offset the losses from the initial shift in the distribution. Despite the observed positive impact of inequality on overall growth, we see a *negative* impact of increased inequality on low and middle income levels (using reasonable accounting periods and discount rates). The small positive impact of rising inequality on economic growth is not sufficiently large to make up for the lost income at the bottom due to the initial shift in the distribution. Under no scenario will currently living workers recoup their income losses during their lifetimes. (Simulation results are presented in **Figure 3**).

The small size of the growth impacts are reflected in **Figure 3A**, which demonstrates that growth in per-capita income over time is very similar under both stable inequality and higher inequality scenarios. With no increase in inequality over the next 75 years, total real per-capita income is projected to rise more than 450 percent.[ix] Frank's findings suggest that greater income concentration would result in 478 percent increase – only slightly larger. **Figure 3B** shows the effect of an increase in the income share held by the top 10% on per-capita personal incomes of the bottom 90% of the distribution. The figure shows per-capita income in a stable inequality scenario less per-capita income in an increased inequality scenario. Initially, the stable inequality scenario produces higher incomes for the bottom 90%, as the increase in inequality reflects a loss in the incomes they would have had under the stable inequality scenario. It takes 68 years for the faster rate of economic growth to produce enough income growth to match per-capita income under the stable inequality scenario.

However, this preliminary result does not use any discount rate to incorporate the change in value of money over time. Greater inequality results in income losses for the bottom today and may produce greater income in later years, but an equivalent amount of money is worth more today than it will be in later years. **Figure 3C** reproduces the previous simulations using two different discount rates. Under a generous 3% discount rate, the Net Present Values of the two streams of income for the bottom 90% of distribution (stable inequality versus higher inequality scenarios) does not equalize until 165 years. Using a more modest 5% discount rate, the Net Present Value of the stream of income under increased inequality never returns to the level seen under a stable inequality scenario.

This assessment suggests that income losses experienced by the bottom 90% of households when the top 10% increases its share are not made up by increased economic growth, leading to a decrease in standards of living despite marginally higher economic growth. This section demonstrates the difficulties of interpreting the empirical connection between inequality and growth, and also motivates the need for a more direct consideration of the impacts of inequality on the standard of living.

5. State Panel Regressions

A direct examination of the impacts of inequality on income levels using state-level panel data and high-income shares as the measure of inequality is the final piece of the analysis. Instead of simulating the implied income levels using findings from the growth literature, this section uses a similar econometric approach as much of the recent growth literature, but uses average income levels for middle and low-income families as the dependent variable.

For the state panel approach to yield valid results, there needs to be sufficient variation across the states in the extent to which inequality has increased. If all states saw very similar increases, then the interstate, over-time variation we are using to identify the impact of inequality on income levels will either be non-existent or unreliable. **Figure 4** – a state-level scatterplot of top income shares in 1980 and 2005 for the top 10% **(Figure 4A)** and the top 1% **(Figure 4B)** illustrates ample cross-state variation. However, for a fixed-effects specification to be valid the variation in the inequality data must be primarily over time, not cross-sectional. Frank (2009) indicates that 78% of the variation in the top 10% income share is within the states, as opposed to only 12% between states.

The state panel data model we are estimating can be written:

(1) $\text{INCOME}_{t,i,g} = \beta(\text{TOPSHARE}_{i,\,t-n}) + \vartheta X_{i,\,t-n} + \delta X_{t-n,i,g} + \alpha_i + \alpha_t + \varepsilon_{i,t}$

The dependent variable is average group income, where g indicates the group (middle-income or low-income) *t* is the time period (year), and "i" is the state. TOPSHARE is the lagged measure of inequality – either the Top 10% share of income or the Top 1% share – that is lagged (n) between one and 15 years depending on the specification. X represents a matrix of control variables, which vary over time (t) and state (i). Some control variables are group-specific. The α_i and α_t represents state and year fixed effects, respectively, which control for unobserved and time-invariant factors unique to each state, and for factors shared by all of the states that are unique to each year. Initially we estimate (1) using OLS with

various control variables and fixed effects for state and year, and then move on to the panel fixed effects estimator (xtreg, fe) adding longer lags for the TOPSHARE variable.

The top share measures of inequality (TOP10 and TOP1) are calculated from IRS tax return statistics by Mark Frank (2009). Frank's top shares data are available from 1916 to 2005. Average income levels for middle and low-income groups by state are calculated using the March CPS, but the yearly income data in the CPS are only available starting in 1979, so the regressions reported below are for 1979 to 2005. In the results presented below "middle-income" includes households between the 35th and 70th percentiles of the income distribution, and "low-income" includes households below the 30th percentile.[x]

The matrix of control variables is consistent with those included in the studies exploring the growth effects of inequality using US state panels, Partridge (2004), Panizza (2002), and Frank (2009). The control variables include time and state-varying economic factors which are expected to be correlated with both income and top shares, including average hours worked, the unemployment rate, the rate of employment growth, the 20-24 year old share of the total population, the black share of the population, the median house price, and the total state population. Descriptive statistics for these variables are included in **Appendix Table 3.**

As is standard in the inequality/growth literature, and most empirical panel data analysis, we use robust standard errors to allow for unknown forms of heteroskedasticity. We also cluster standard errors at the state-level to allow for an arbitrary variance-covariance structure within each state.

In the baseline specifications we regress group income on a one-year lag of the top-share value. We also allow the lag structure to vary, and include specifications with lags of 5, 10, and 15 years. We explored using longer-term lags than 15 years (as high as 25 years), but coefficients on these longer lags are very small, do not have any consistent sign, and are not significantly different from zero.

6. Findings

One set of regression results is presented in **Appendix Table 4**. These results reflect the impacts of increases in the Top 10% share of income on average income levels of middle-income families (defined as the 35th to the 70th percentiles of the income distribution.) All of the results use the natural log of

income and the natural log of the top income share (expressed as numbers 1 to 100), so the coefficients of interest are elasticities.[xi]

A naïve examination of the relationship **(Column 1)** – one without any control variables – suggests a positive relationship, unsurprising given the post 1980 upward trends previously shown in Figure 1. A ten percent increase in the top 10% share is correlated with a 5.5 percent increase in income for those in the middle of the distribution. Since income levels and top shares are both cyclical it is important to control for cyclical factors. Once we account for basic economic factors (the unemployment rate, industry composition, and home prices), the relationship between inequality and middle-incomes turns negative **(Column 2)**.[xii] A ten percent rise in the top share results in a 2.4 percent decline in middle-income levels, although the impact is not significantly different from zero at standard levels.

All of the succeeding columns introduce additional covariates – such as demographic factors and hours of work -- that are important to take into consideration when attempting to determine the relationship between top shares and middle income levels. . State and year fixed effects are also included to account for unobservable omitted variables that are either common to a state or common to a year. **Columns 3 through 7** all suggest very small (not statistically different from zero) and typically negative relationships between the top-income share and middle-income levels.[xiii]

The final set of columns (**Columns 8 through 10**) introduce lags of the independent variable to explore whether the contemporaneous negative effect misses a potentially different longer-term relationship between inequality and income levels.[xiv] The introduction of lagged values of inequality does not change the variable's observed negative effect, but it does increase the strength of the relationship and produce many results that are statistically significant. Adding a 15 year lag, for example **(Column 9)** suggests that a 10 percent increase in inequality from 15 years ago leads to a 1.6 percent decline in current income level for middle-income families.

Equivalent regressions have been run using earnings instead of income, the top 1% share, for low-income families (below the 30th percentile), different definitions of both low and middle-income groups. Complete tables for these various iterations are available from the authors, but each of the variations yield comparable results, with the key findings summarized in **Table 1.**

The same basic findings hold when we look at earning instead of income, low-income groups instead of middle-income, and when we look at changes in the top 1% share of income instead of top 10%. The findings are also robust to different definitions of low and middle-income.[xv] The most notable difference across the specifications highlighted in Table 1 is that the contemporaneous impact on income is more pronounced for lower income households, while the lagged impacts are relatively more important for middle-incomes. So a 10 percent increase in the income share of the top 10 percent leads to 0.5 percent decline in middle-incomes and a 5.2 percent decline in low incomes, based on the specification with control variables, fixed effects, and only a one-year lag for the inequality variable (equivalent to specification 7 in Appendix Table 4). When a 10-year lag is added to that specification (equivalent to specification 8), the lag results in a two percent decline in middle-incomes and a 3.3 percent decline in low incomes.

Also, the coefficients from the earnings regressions are nearly uniformly larger than those from the income regressions, although the pattern of sign and significance across the specifications are similar to the income regressions. In the specification including 1, 5, 10, and 15-year lags (equivalent to specification 10 in Appendix Table 4), a ten percent increase in the top 10 percent share, leads to a 1.2 percent decline in income of the middle-income households and a 1.9 percent decline in earnings.

While Frank (2009) and Andrews, Jencks, and Leigh (2010) both find that changes in the top 1% share have larger impacts on growth, our results suggest that increases in the top 10% share has a stronger impact on income levels.

Additional specifications for each of the measures of inequality and for both income groups and outcome variables, that include a full set of lags for 15-years reinforce all of these patterns as well. The key result – the sum of the lags – is included in the final column of Table 1 and the full regression results are included in Appendix Table 5. The combined impact of the lags is negative for all eight specifications, and the combined impact is larger for earnings and for changes in the top 10 percent share. For increases in the top 10 percent share, the sum of the inequality lags in the earnings regressions is -.68 for middle-income families and -1.4 for low-income families. In most cases, the impact of changes in inequality is also larger for low-income families, with the exception of the impact of changes in the top 1 percent share on income. In that case, the sum of the lags from a 10 percent rise in the top 1 percent share is -2.2 percent for middle-income and -1.7 percent for low incomes.

7. Discussion and Conclusion

The findings of this study suggest that rising top shares lead to declining earnings and incomes of low and middle-income households. This outcome would be expected if greater inequality leads to lower economic growth (which some studies suggest), but is also plausible even if inequality leads to greater overall economic growth (as other studies suggest.) In the latter case, the algebraic explanation is that the growth impact is simply too weak to overcome the distribution effect, leaving most households with lower incomes following increases in the top share. The previous literature on both the impact of inequality on growth as well as the research on the factors causing rising inequality offer a number of plausible explanations for these findings.

There are a number of ways that increasing concentrations of income and wealth could lead to lower income and earnings among non-affluent households. One way concerns the consumption and savings/investment behavior of rich households. If the rich spend a larger portion of their income on luxury items, imports, foreign travel, or in other ways that do little to boost domestic aggregate demand, then concentrating more income in fewer hands could undermine local and regional economies. To some extent, this echoes arguments made by Murphy, Shleifer, and Vishny (1989) in an international development context. Also, the rich save considerable portions of their income. In fact, on average the affluent are the only savers, as average worth is negative below the 80th percentile of the income distribution. Saving, however, is international. When affluent households invest in stocks, bonds, and privately-held corporations in other states or countries, there is no obvious way that the savings of the rich boost a particular state or local economy. Ultimately, the basic economic behavior of the rich may not be consistent with the broad-based prosperity experienced in the US in the post-war period, and the return to pre-Great Depression levels of concentrations of income could be steadily undermining the economic conditions that supported rising incomes for low and middle-income households for so many decades.

The location decisions of rich households could also further undermine income and earnings of low and middle-income households. In the early 1990s former labor secretary Robert Reich (1991) coined the phrase the “secession of the successful” to describe affluent household retreating from and withdrawing support for public institutions. Reich described affluent households, ensconced in gated communities

and sending their kids to private schools, increasingly opposed to paying for public services. This concern is validated by the work of Mayer (2002), who has documented how rising inequality in the 1970s and 1980s led to greater residential segregation by income group, with high-income households increasingly locating in neighborhoods and school districts largely populated by other high-income families. This segregation further undermines the tax base in lower-income communities making it harder to afford schools and other local public services. When communities become less safe and less able to educate their children, then the lower and middle-income families in those communities can expect their economic prospects, including their earnings and their incomes, to diminish.

It is also possible that the changes in income among non-affluent households are not caused directly by rising inequality, but are instead lagged effects of the same factors that caused the rising inequality in the first place. The voluminous literature exploring the causes of rising inequality in recent decades offers a number of possible explanations for the relationship we observe between rising top share and falling incomes of low and middle-income families.

One explanation concerns the weakening of economic institutions that bolster the wages and incomes of low and middle-income households. Labor unions represented 27 percent of American workers as late as 1979, but that share had declined to 13 percent by 2010.[xvi] The inflation-adjusted value of the minimum wage has also declined over time. Despite a number of increases in recent decades, by 2010 the federal minimum wage had just 74 of the purchasing power from its level in 1969. This decline is only slightly offset by the handful of states adopting higher minimum wage levels. These institutions, along with rising "globalization," have been prime candidates in many of the studies attempting to explain rising inequality.[xvii] In some studies (Card and DiNardo (2002) and Lee (1999), for example), these institutions have been found to account for substantial portions of the rise in inequality. To the extent these institutional changes have caused greater inequality – by increasing the effective supply of labor and undermining the bargaining position of unions and working people in general – they also could be contributing to the decrease in earnings and incomes that we find.

Another explanation for growing inequality that could also plausibly account for the relationship between rising inequality and falling earnings and income among the non-affluent is "skill-biased technological change (SBTC)." A number of studies (Bound and Johnson, 1992, for example) have found evidence to support the idea that changes in technology have driven up the earnings of skilled workers

and left the relatively unskilled to face decreased demand and falling wages. This explanation, though, has also been critiqued by other researchers (Card and DiNardo (2002), Mishel, Bernstein, and Shierholtz, 2008, and Dew-Becker and Gordon, 2005, among others) for failing to match the timing of changes in wage inequality, and for the fact that managers and other administrators have exhibited the most dramatic pay increases, while young and highly-skilled workers – the protagonists in the SBTC story – have had only meager real wage gains.

In addition to the SBTC theory, other technology-related explanations have been offered to explain rising inequality that are also potentially consistent with our findings in this paper. One is Rosen's (1981) "superstar" explanation, which suggests that a handful of talented or well-placed individuals have been able to capture increasingly large shares of revenue in various fields (singers, actors, authors, and athletes, for example) because of the "audience magnification" produced by advances in communications technology. Indeed, several recent papers have argued that superstars, in these fields as well as lawyers and CEOs, account for a large portion of rising inequality in recent years (Kaplan and Rauh (2009) and Walker (2005)).

The "superstar" phenomenon has become increasingly important, but, as Smeeding and Thompson (2011) argue, all of the "superstars" across every potential field still only account for a tiny share of even the top one-percent of the income distribution. Furthermore, a considerable – and rising – factor in the wealth and income of the richest Americans is due to ownership of businesses and other assets (Smeeding and Thompson, 2011).

The work of Lucian Bebchuk and his co-authors on corporate compensation also casts doubt on the means by which superstars in the corporate world reap their out-sized paychecks. Bebchuk and Grinstein (2005) find that total compensation for the top five (per-firm) executives was 5 percent for firm net earnings in 1991-93 and had risen to almost 10 percent by 2001-03. This dramatic and steady raise could not be accounted for by any measures of profitability, firm value or performance. Higher CEO pay is associated with decreased firm valuation (Bebchuk, Cremers, and Peyer (2010)).[xviii] Higher CEO pay is also associated with entrenched board of directors (Bebchuk, Cohen, and Ferrell, 2009). Bebchuk and his coauthors suggest that the dramatic rise in corporate compensation might be best explained by the emergence, entrenchment, and exercise of "managerial power," as opposed to a market-driven reward for the value of CEO services.

This paper is unable to differentiate among the many plausible explanations for the negative relationship between rising top income shares and falling incomes among non-affluent households. Future work will focus attention on the competing causal factor behind the relationship. We will include additional factors that have been argued to drive changes in inequality to see if the explanatory power of inequality itself is reduced. Future work will also incorporate the impacts of taxes on the inequality/income relationship, as suggested in Andrews, Leigh, and Jencks (2010). Following Kenworthy (2010), we will also explore the role of transfer programs in either mitigating or exacerbating the impacts of inequality on standards of living for middle and low-income families.

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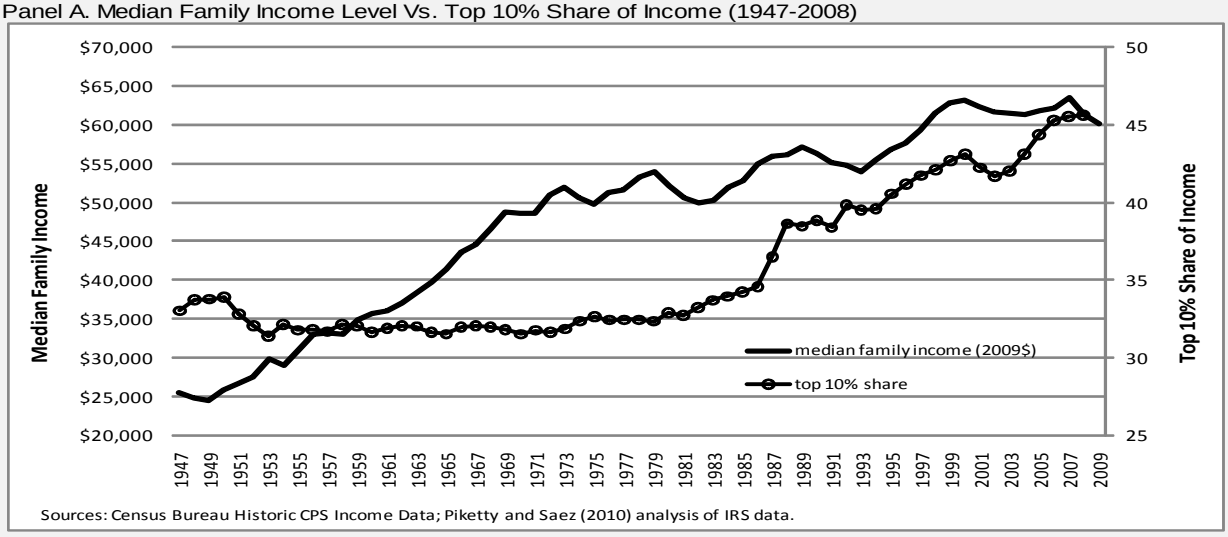
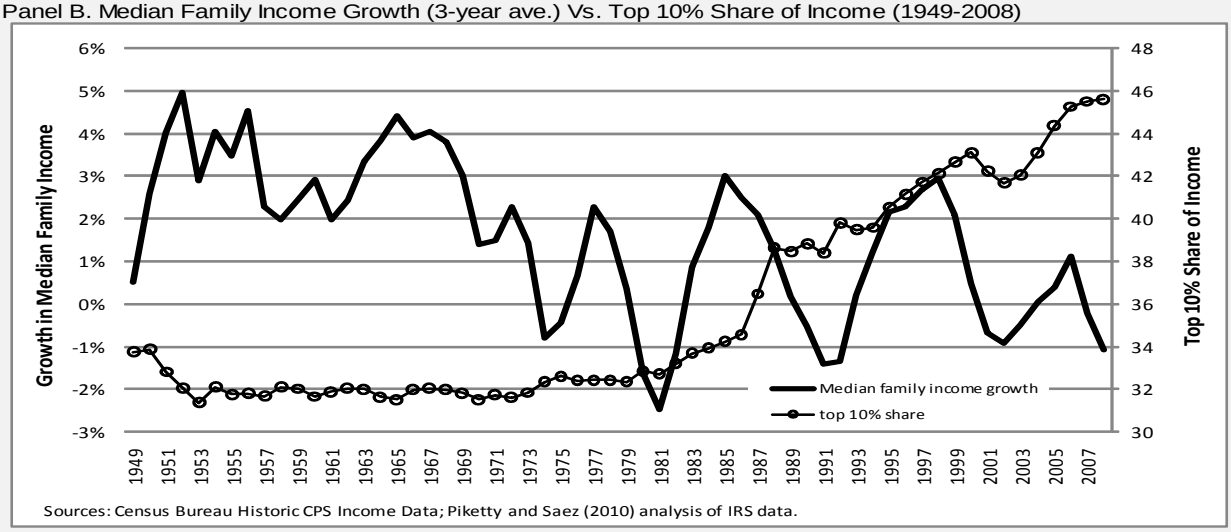
Figure 1. Real Median Family Income and Top 10% Share of Income - National Data

Panel A. Median Family Income Level Vs. Top 10% Share of Income (1947-2008)



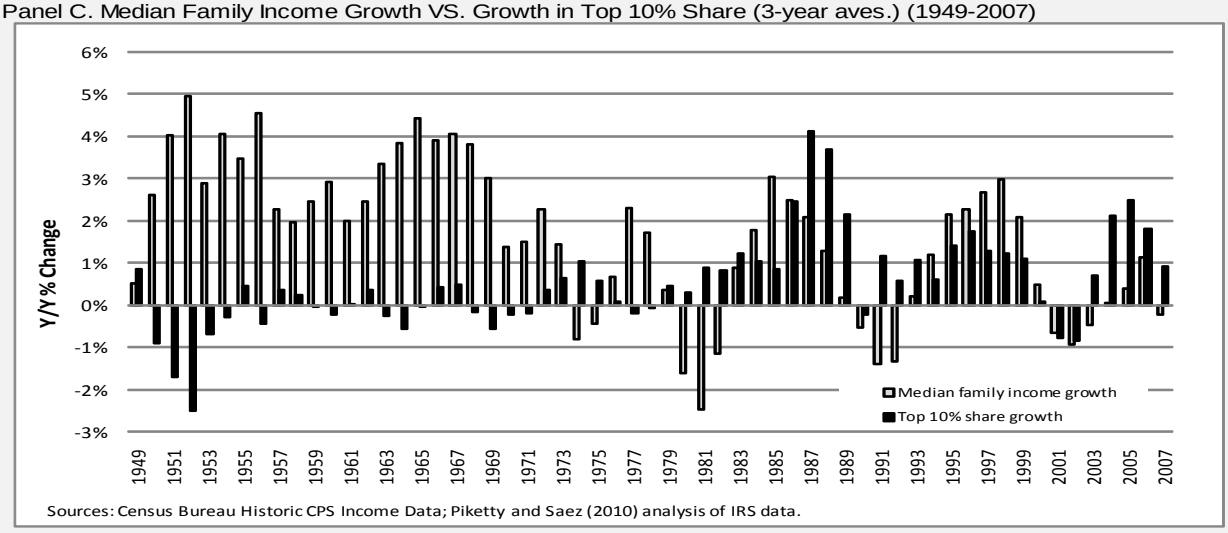
Sources: Census Bureau Historic CPS Income Data; Piketty and Saez (2010) analysis of IRS data.

Panel B. Median Family Income Growth (3-year ave.) Vs. Top 10% Share of Income (1949-2008)



Sources: Census Bureau Historic CPS Income Data; Piketty and Saez (2010) analysis of IRS data.

Panel C. Median Family Income Growth VS. Growth in Top 10% Share (3-year aves.) (1949-2007)



Sources: Census Bureau Historic CPS Income Data; Piketty and Saez (2010) analysis of IRS data.

Note: Median income expressed in 2009 dollars, adjusted for inflation using CPI-U.

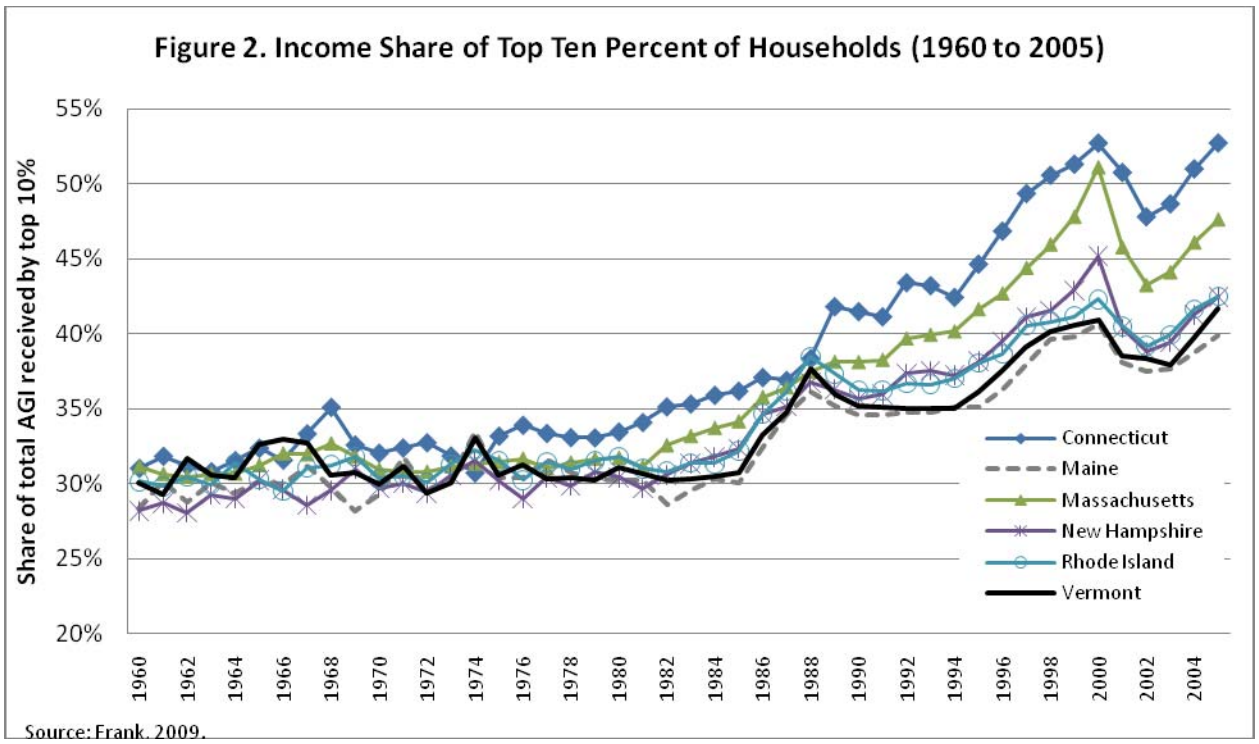
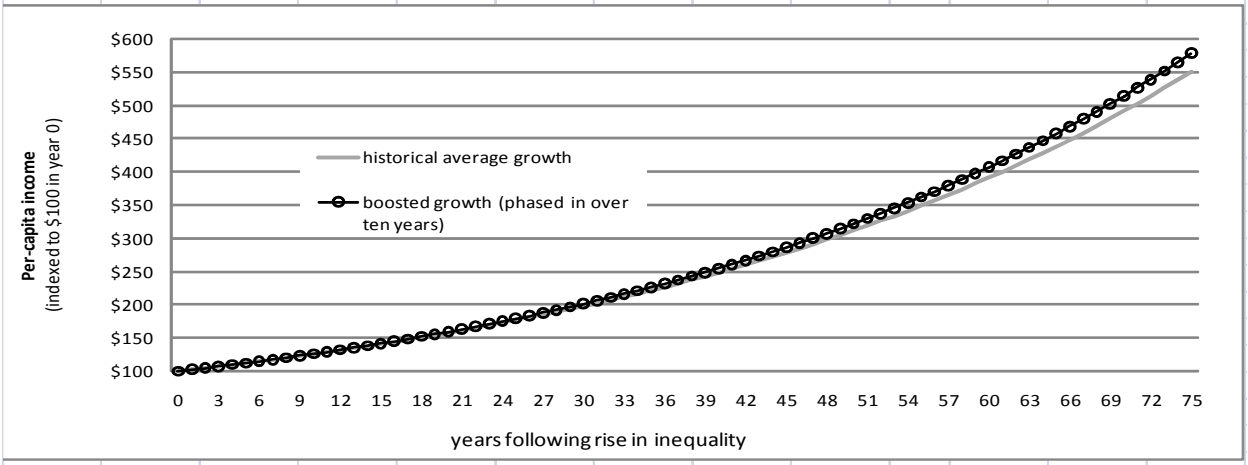


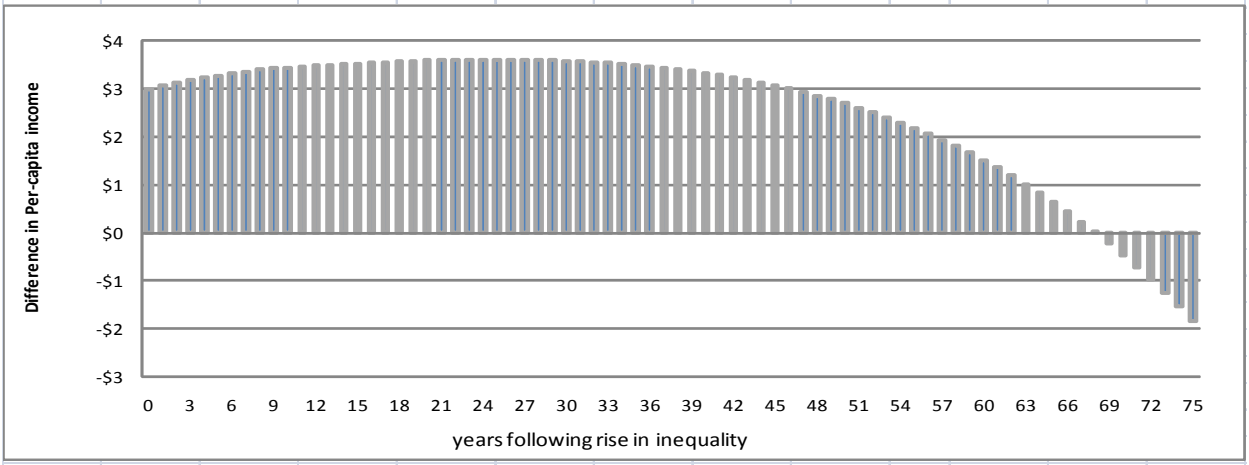
Figure 2. Income Share of Top Ten Percent of Households (1960 to 2005)
Share of total AGI received by top 10%
55%
50%
45%
40%
35%
30%
25%
20%
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
Connecticut
Maine
Massachusetts
New Hampshire
Rhode Island
Vermont
Source: Frank, 2009.

Figure 3. Recapturing lost income at the bottom

Real per-capita personal income - historic average growth rates constasted with increased growth rate due to greater inequality (Frank, 2008)

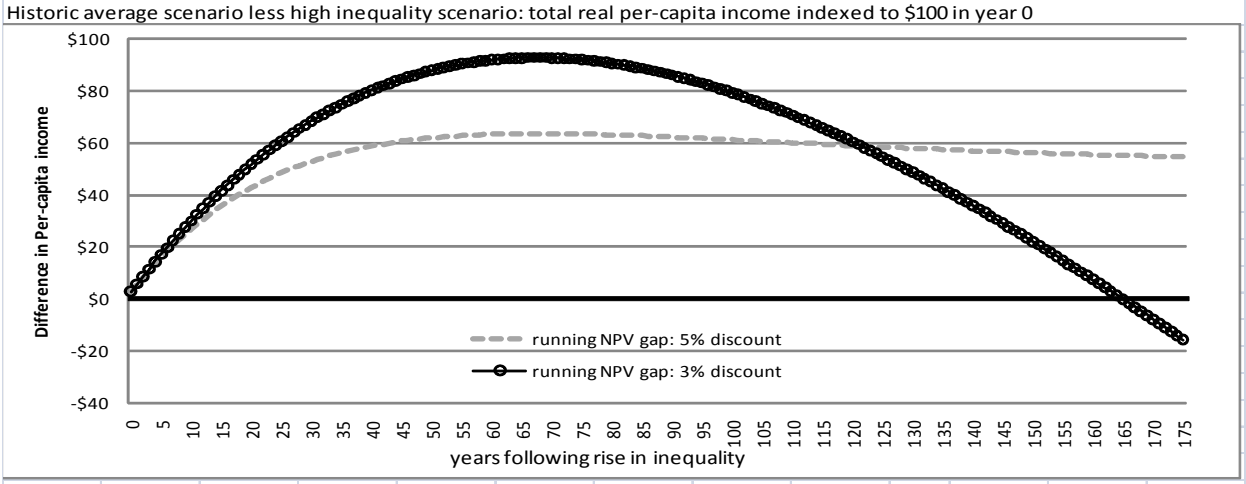


Bottom 90% portion of real per-capita personal income - historic average less greater inequality scenario



Gap in running NPV of real per-capita income of bottom 90% under historic average growth scenario and increased growth with higher inequality scenario, using 3% and 5% discount rates

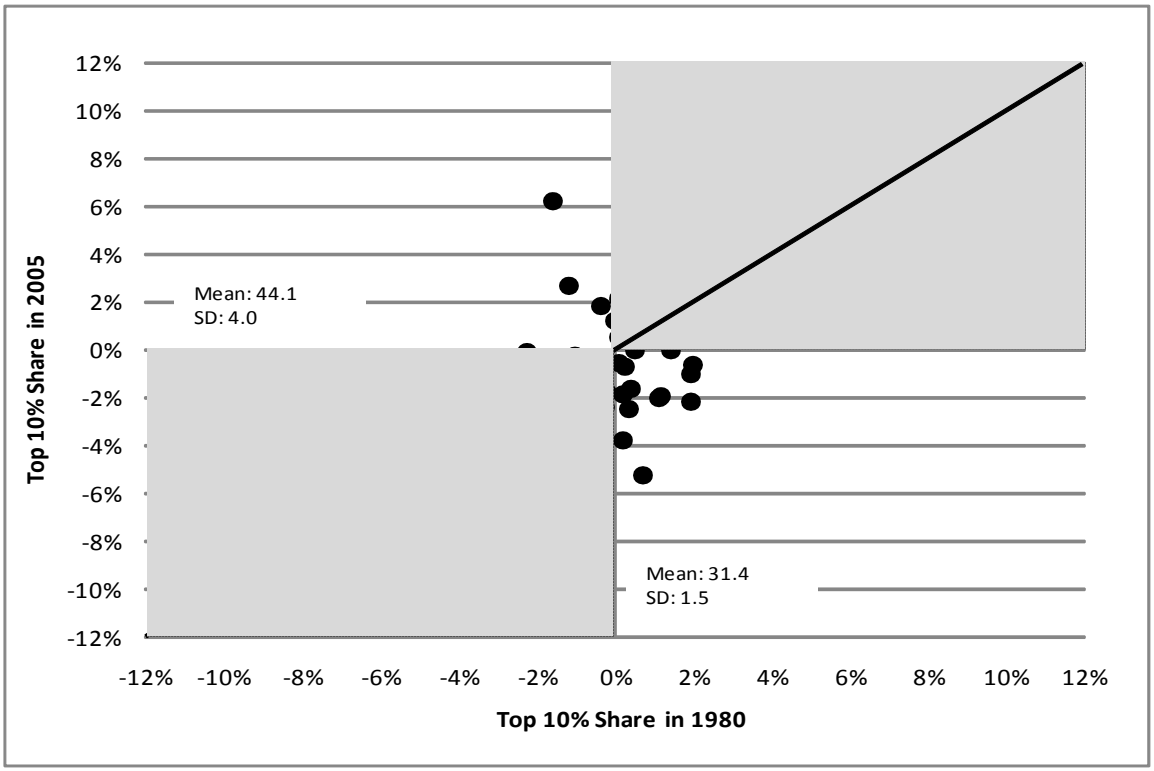
Historic average scenario less high inequality scenario: total real per-capita income indexed to $100 in year 0



Note: results are based on findings in Frank (2009), where a 2 SD increase in the top 10% share of income leads to a .072 percent increase in the growth of real per-capita personal income.

Figure 4. Shifting Top Shares Across States

Panel A. Top 10% share in 1980 and 2005 (Relative to National Mean)



Panel B. Top 1% share in 1980 and 2005 (Relative to National Mean)

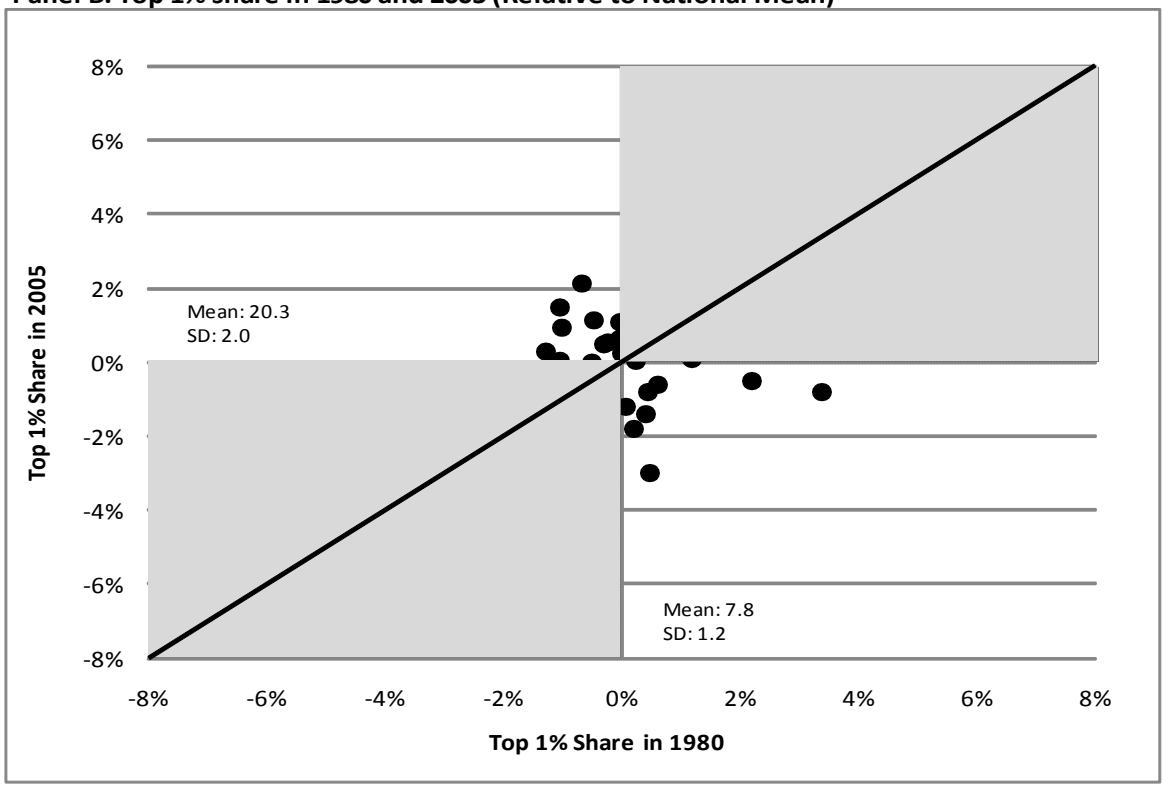


Table 1. Summary Key Coefficients, by Specification, Income Group, and Inequality Measure

		Key Coefficient								
				Control variables, plus state and year fixed effects, and 10-year Lag		Control variables, fixed effects, and various lags				Control variables, fixed effects, and full 15-year lags
Income Group	Inequality Measure	No controls	Control variables, plus state and year fixed effects	L1	L10	L1	L5	L10	L15	SUM of All Lags
Panel A. Impact on Household Income										
Middle-income	Top 10% Share	0.54723	-0.04953	-0.00682	-0.20033	0.00603	0.00133	-0.17561	-0.12227	-0.36119
		(0.07313)**	(0.07879)	(0.07683)	(0.04515)**	(0.07746)	(0.05025)	(0.04391)**	(0.05907)*	
	Top 1% Share	0.20046	-0.01930	-0.01624	-0.04215	-0.01848	-0.01166	-0.04125	-0.03167	-0.11538
		(0.03231)**	(0.01926)	(0.01904)	(0.01912)*	(0.01847)	(0.02075)	(0.01999)*	(0.02691)	
Low-income	Top 10% Share	0.44266	-0.51622	-0.44248	-0.32512	-0.34696	-0.24336	-0.26161	0.00519	-0.90814
		(0.09499)**	(0.10459)**	(0.09582)**	(0.06208)**	(0.10553)**	(0.14732)	(0.06692)**	(0.06898)	
	Top 1% Share	0.17368	-0.07276	-0.06449	-0.04733	-0.04944	-0.09379	-0.03752	0.03695	-0.16579
		(0.03867)**	(0.03019)*	(0.03116)*	(0.02844)	(0.02972)	(0.03083)**	(0.02697)	(0.02709)	
Panel B. Impact on Earnings										
Middle-income	Top 10% Share	0.51138	-0.15235	-0.07907	-0.31520	-0.03946	-0.04367	-0.26170	-0.19801	-0.68185
		(0.09529)**	(0.10860)	(0.10489)	(0.07699)**	(0.10365)	(0.06616)	(0.06859)**	(0.07019)**	
	Top 1% Share	0.16892	-0.03366	-0.02967	-0.07380	-0.02718	-0.05154	-0.06824	-0.03372	-0.22447
		(0.04067)**	(0.03035)	(0.02905)	(0.02727)**	(0.02714)	(0.02684)	(0.02720)*	(0.03402)	
Low-income	Top 10% Share	0.74481	-0.65787	-0.53387	-0.58315	-0.34349	-0.49497	-0.46323	0.05158	-1.40384
		(0.17202)**	(0.21220)**	(0.19716)**	(0.08931)**	(0.18630)	(0.18066)**	(0.10221)**	(0.11849)	
	Top 1% Share	0.26261	-0.08188	-0.07392	-0.05927	-0.04989	-0.13418	-0.04554	0.07259	-0.16757
		(0.07811)**	(0.05134)	(0.05079)	(0.04554)	(0.04826)	(0.05221)*	(0.04080)	(0.05288)	

* significant at 5%; ** significant at 1%

Appendix Table 1 -- Summary of Cross-Country Studies on Inequality and Growth

Author	Data	Method	Result
Alesina and Rodrik (1994)	Fields (1989), Taylor and Hudson (1972)	OLS, 2SLS	Inequality has a significant negative impact on growth
Persson and Tabellini (1994)	Paukert (1973)	OLS	Inequality has a negative impact -- not robust
Clarke (1995)	Summers and Heston (1991)	OLS, 2SLS, WLS	4 different measures of inequality have a significant negative impact
Deininger and Squire (1998)	Deininger and Squire (1998)	OLS	Income inequality shows a negative effect (not robust, land inequality shows a significant negative impact.
Li and Zou (1998)	Deininger and Squire (1998)	Fixed and Random Effects	Income inequality has a significant positive impact
Forbes (2000)	Deininger and Squire (1998)	Fixed and Random Effects	Income inequality has a significant positive impact
Barro (2000)	Deininger and Squire (1998) + some other data that Deininger and Squire did not include	Random Effects, 3SLS	No robust relationship between inequality and growth.
Banerjee and Duflo (2003)	Deininger and Squire (1998)	Fixed and Random Effects, Arellano and Bond	No robust relationship between inequality and growth.
Voitchovsky (2005)	Luxembourg Income Study (LIS)	GMM Estimator	A single measure of inequality may be unable to capture the complex and varying relationship between inequality and growth, and inclusion of multiple measures may be necessary
Andrews, Jencks, and Leigh (2010)	Top Shares (from tax data) for inequality measure	Fixed Effects	No relationship over 1905-2000 period, but after 1960 rising top shares lead to growth in per-capita GDP.

Appendix Table 2 -- Summary of the Empirical Literature on Growth and Inequality in the US

Author	Data	Methods	Results
Partridge (1997)	Decadal panel composed of census data from 1960 -- 1990	OLS	Positive impact of both inequality and the middle class income share
Panizza (2002)	Decadal panel of tax return data from 1940 -- 1980	OLS, fixed effects	Negative impact, not robust, at the very least, no positive impact
Partridge (2004)	Decadal penal of census data from 1960 - 2000	OLS, fixed effects, random effects	Positive impact using OLS and random effects, unstable impact using fixed effects
Frank (2009)	Yearly panel from tax return data, extending from 1945 - 2005	Dynamic Panel Estimators	Robust and positive impact of inequality on growth

Appendix Table 3. Descriptive Statistics of Key Variables (1979 to 2005)

Variable	# of observations	Mean	Standard Deviation	Minimum	Maximum
mean income (0 to 30th percentile)	1326	10,531	3,590	3,718	21,965
mean income 35th to 70th percentile	1326	32,676	10,787	13,042	63,879
mean earnings (0 to 30th percentile)	1326	4,418	2,033	991	13,573
mean earnings 35th to 70th percentile	1326	22,551	7,887	8,766	47,193
top 10% income share	1326	37.8	4.7	28.5	53.9
top 1% income share	1326	13.2	3.7	5.8	27.5
mean total family work hours (0 to 30th ptile)	1326	928.0	220.8	376.0	1,609.4
mean total family work hours (35th to 70th ptile)	1326	2,519.9	253.1	1,452.2	3,230.1
Agriculture%	1300	0.031	0.026	0.002	0.146
Mining%	1300	0.011	0.017	0.000	0.145
Construction%	1300	0.055	0.011	0.000	0.104
Manufacturint%	1300	0.128	0.055	0.000	0.274
Transportation%	1300	0.046	0.010	0.000	0.080
Finance%	1300	0.073	0.016	0.045	0.141
Services%	1300	0.284	0.065	0.158	0.499
Government%	1300	0.159	0.034	0.100	0.329
Trade%	1278	0.201	0.026	0.123	0.244
Unemployment Rate	1326	5.9	2.0	2.3	16.7
Employment Growth Rate	1326	1.7	1.9	-4.8	9.8
20to24 year old share of population	1326	7.8	1.2	5.4	11.5
Black share of population	1326	10.9	12.0	0.2	70.4

Appendix Table 4. Regression results showing impact of top income 10% share on middle-income levels, using various lags and control variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS basic	OLS plus economic conditions/ind. composition	OLS plus demographic factors	OLS plus public benefits	OLS plus hours worked	OLS plus year effects	OLS plus state effects	xtreg FE with 10-year lags	xtreg FE with 15-year lag	xtreg FE with several lags
L1.TOPSHARE	0.54723	-0.24137	-0.08379	0.04741	-0.05901	-0.03013	-0.04953	-0.00682	-0.03082	0.00603
	(0.07313)**	(0.13794)	(0.15448)	(0.09735)	(0.09429)	(0.12881)	(0.07879)	(0.07683)	(0.07996)	(0.07746)
L5.TOPSHARE										0.00133
										(0.05025)
L10.TOPSHARE								-0.20033		-0.17561
								(0.04515)**		(0.04391)**
L15.TOPSHARE									-0.15600	-0.12227
									(0.05541)**	(0.05907)*
L1.Income										
unemp_rate		-0.01538	-0.01351	-0.01233	0.00845	0.00687	0.00198	0.00149	0.00167	0.00166
		(0.00762)*	(0.00699)	(0.00479)*	(0.00443)	(0.00557)	(0.00225)	(0.00208)	(0.00217)	(0.00214)
ln_med_house_price		0.27683	0.26846	0.26913	0.23139	0.23286	0.08131	0.08546	0.08140	0.08165
		(0.04282)**	(0.03820)**	(0.02917)**	(0.03135)**	(0.03738)**	(0.02554)**	(0.02369)**	(0.02379)**	(0.02402)**
age_2024_share			0.00180	-0.02751	-0.02519	-0.03609	-0.00030	-0.00166	-0.00206	-0.00286
			(0.01356)	(0.00874)**	(0.00768)**	(0.01034)**	(0.00529)	(0.00466)	(0.00474)	(0.00485)
black_share			-0.00548	-0.00392	-0.00331	-0.00273	0.00485	0.00458	0.00395	0.00459
			(0.00150)**	(0.00098)**	(0.00091)**	(0.00090)**	(0.00616)	(0.00584)	(0.00570)	(0.00560)
ln_population			0.02570	0.01776	0.01914	0.01874	0.02662	0.03262	0.03145	0.03691
			(0.01758)	(0.01467)	(0.01410)	(0.01212)	(0.04227)	(0.04048)	(0.04012)	(0.04001)
(mean) stben_inc_35_70a				-0.00001	0.00001	0.00011	-0.00001	-0.00001	-0.00001	-0.00001
				(0.00003)	(0.00002)	(0.00003)**	(0.00001)	(0.00001)	(0.00001)	(0.00001)
(mean) natben_inc_35_70				-0.00009	-0.00004	-0.00002	0.00000	0.00000	0.00000	0.00000
				(0.00001)**	(0.00001)**	(0.00001)*	(0.00001)	(0.00001)	(0.00001)	(0.00001)
ln_mean_fam_hours_35_70					0.70290	0.81714	0.52735	0.52841	0.53907	0.53432
					(0.08061)**	(0.08615)**	(0.03757)**	(0.03523)**	(0.03471)**	(0.03391)**
Constant	8.75354	9.71615	8.67408	9.12068	3.61866	2.68675	5.53373	6.23556	6.12037	6.44707
	(0.26651)**	(0.61096)**	(0.70027)**	(0.52142)**	(0.76015)**	(0.93008)**	(0.71048)**	(0.61884)**	(0.64240)**	(0.62526)**
Observations	1326	1278	1278	1278	1278	1229	1229	1278	1278	1278
R-squared	0.16	0.55	0.60	0.74	0.79	0.83	0.95	0.82	0.82	0.82
Number of state								50	50	50

Robust standard errors in parentheses
* significant at 5%; ** significant at 1%

Year and state fixed effects, as well as industry composition variables are excluded for space.

Appendix Table 5. Fixed Effects Regression Results with Full Lags, by Inequality Definition, Income Group, and Dependent Variable

DEPVAR	Earninings				Income			
INCOME GROUP	MIDDLE (35-70)		LOW (0-30)		MIDDLE (35-70)		LOW (0-30)	
INEQUALITY	TOP10	TOP1	TOP10	TOP1	TOP10	TOP1	TOP10	TOP1
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
L1.Inequality	-0.09557	-0.03360	-0.10245	-0.03486	-0.04983	-0.01734	-0.28873	-0.03736
	(0.10760)	(0.03002)	(0.14644)	(0.04780)	(0.07823)	(0.02263)	(0.11510)*	(0.03171)
L2.	0.16123	-0.01634	-0.17447	0.00396	0.09346	-0.01159	-0.02614	-0.02005
	(0.07309)*	(0.02140)	(0.12093)	(0.04274)	(0.05733)	(0.01689)	(0.07743)	(0.01972)
L3.	-0.05959	-0.00384	-0.07778	0.01505	-0.00304	-0.00625	-0.03686	0.00014
	(0.05747)	(0.02094)	(0.20025)	(0.05913)	(0.04381)	(0.02110)	(0.09761)	(0.03042)
L4.	0.00175	0.04515	0.03381	-0.11928	0.02881	0.00779	0.05333	-0.05951
	(0.05750)	(0.02671)	(0.16595)	(0.05248)*	(0.04776)	(0.02440)	(0.10930)	(0.03747)
L5.	0.08259	-0.01595	-0.00836	0.01800	0.06128	0.03808	-0.09063	0.02243
	(0.05903)	(0.02506)	(0.17544)	(0.05997)	(0.05065)	(0.02027)	(0.10454)	(0.03157)
L6.	-0.03335	-0.05549	-0.41299	-0.10279	-0.02979	-0.04784	-0.12110	-0.05971
	(0.04617)	(0.02558)*	(0.12429)**	(0.05467)	(0.05662)	(0.02083)*	(0.06118)	(0.03438)
L7.	-0.04443	-0.00580	0.07305	0.00822	0.04231	0.01555	-0.03421	-0.02927
	(0.04902)	(0.02049)	(0.13909)	(0.04850)	(0.03022)	(0.01583)	(0.07929)	(0.02733)
L8.	-0.04415	-0.03222	-0.36207	-0.02647	-0.03576	-0.01594	-0.11151	-0.02003
	(0.05492)	(0.02990)	(0.14085)*	(0.06440)	(0.04503)	(0.01994)	(0.06647)	(0.03410)
L9.	-0.00690	0.00460	-0.03960	0.02561	-0.00395	-0.01139	-0.08223	0.00189
	(0.05633)	(0.02338)	(0.14268)	(0.05676)	(0.04130)	(0.01965)	(0.09508)	(0.03964)
L10.	-0.07854	-0.04568	-0.24594	-0.06392	-0.08543	-0.01538	-0.10848	-0.04314
	(0.05074)	(0.01683)**	(0.11883)*	(0.04872)	(0.04088)*	(0.01630)	(0.07612)	(0.03449)
L11.	-0.19129	-0.00386	0.00016	-0.03268	-0.08364	-0.00498	-0.05942	0.00201
	(0.06635)**	(0.02405)	(0.16018)	(0.04650)	(0.04132)*	(0.01857)	(0.08945)	(0.02895)
L12.	-0.12172	-0.00074	-0.22199	0.00437	-0.05082	0.02456	-0.04521	0.06774
	(0.05627)*	(0.02053)	(0.12433)	(0.04618)	(0.04302)	(0.01848)	(0.07137)	(0.02932)*
L13.	-0.10127	0.00046	0.01695	0.02940	-0.10940	-0.02136	-0.07065	-0.02656
	(0.05580)	(0.02528)	(0.13243)	(0.05444)	(0.04523)*	(0.02076)	(0.06902)	(0.03202)
L14.	-0.04634	-0.03849	0.02408	0.11333	-0.06532	-0.02755	0.10706	0.02021
	(0.05761)	(0.02461)	(0.12338)	(0.06813)	(0.04855)	(0.02010)	(0.06166)	(0.03529)
L15.	-0.10427	-0.02267	0.09376	-0.00551	-0.07007	-0.02174	0.00664	0.01542
	(0.07626)	(0.03289)	(0.11905)	(0.04757)	(0.06366)	(0.02665)	(0.06642)	(0.02640)
SUM of INEQUALITY LAGS	**-0.682**	**-0.224**	**-1.404**	**-0.168**	**-0.361**	**-0.115**	**-0.908**	**-0.166**
family_hours_worked	0.87935	0.87798	0.89048	0.86205	0.54001	0.53520	0.35424	0.33914
	(0.04487)**	(0.04750)**	(0.04465)**	(0.05039)**	(0.03519)**	(0.03786)**	(0.02610)**	(0.03106)**
benefits (state)	-0.00003	-0.00004	-0.00014	-0.00014	0.00001	-0.00000	0.00001	0.00001
	(0.00002)	(0.00002)*	(0.00003)**	(0.00003)**	(0.00001)	(0.00001)	(0.00002)	(0.00002)
benefits (fed)	-0.00003	-0.00003	-0.00002	-0.00002	-0.00000	-0.00000	0.00007	0.00007
	(0.00001)**	(0.00001)**	(0.00001)	(0.00001)	(0.00001)	(0.00001)	(0.00001)**	(0.00001)**
unemployment	-0.00224	-0.00189	-0.00424	-0.00431	0.00036	0.00039	-0.00515	-0.00442
	(0.00227)	(0.00252)	(0.00646)	(0.00689)	(0.00183)	(0.00204)	(0.00328)	(0.00356)
job growth	-0.00761	-0.00755	-0.00638	-0.00459	-0.00586	-0.00618	-0.00418	-0.00334
	(0.00162)**	(0.00185)**	(0.00285)*	(0.00325)	(0.00147)**	(0.00162)**	(0.00152)**	(0.00169)
20 to 24 share	0.00097	0.00739	0.04486	0.04647	-0.00389	0.00133	0.02098	0.02213
	(0.00660)	(0.00620)	(0.01177)**	(0.01285)**	(0.00503)	(0.00469)	(0.00602)**	(0.00689)**
black_share	0.01002	0.00786	0.00549	0.00243	0.00572	0.00463	-0.00523	-0.00636
	(0.00663)	(0.00713)	(0.01339)	(0.01554)	(0.00561)	(0.00631)	(0.01052)	(0.01168)
population	0.03356	0.02879	0.05643	0.02182	0.05338	0.04863	0.12665	0.10854
	(0.05095)	(0.05923)	(0.09326)	(0.11109)	(0.04132)	(0.04490)	(0.06233)*	(0.06787)
Constant	5.07351	3.19864	5.56466	1.63016	6.80685	5.85979	7.91686	5.39266
	(0.92111)**	(0.89993)**	(1.84847)**	(1.84505)	(0.69939)**	(0.69769)**	(0.97918)**	(1.06778)**
Observations	1278	1278	1278	1278	1278	1278	1278	1278
# states	50	50	50	50	50	50	50	50
R-squared	0.79	0.78	0.74	0.73	0.82	0.81	0.69	0.67

Robust standard errors in parentheses. * significant at 5%; ** significant at 1%.

Note: Year fixed effects, and covariates for industry share not shown for space.

[i] For a review see Brandolini, Andrea and Timothy Smeeding (2009).

[ii] For a review of the health literature, see Leigh, Jencks, and Smeeding (2009). Jencks (2002) also reviews the impacts of inequality on several other social and economic outcomes, including college attendance, crime, and "happiness," and concludes that, while existing research tends to find a negative impact of greater inequality, that the impacts are weak and that additional research is required before firm conclusions can be drawn.

[iii] In their analysis of public opinion on the distribution of income and wealth, Norton and Ariely (2011) find that Americans, on average, believe that under the ideal distribution of wealth the top fifth of households would hold approximately one-third of all wealth and the bottom fifth of households approximately 10 percent. This ideal distribution is far more egalitarian than both the actual distribution of wealth (top fifth: 85%; bottom fifth: 0.1%) and well as the public's "estimate" of the existing distribution (top fifth: 58%; bottom fifth: 3%). McCall and Kenworthy (2009) also review public opinion on income inequality over several decades and find that the public is generally concerned about and not supportive of the rising trend toward greater inequality.

[iv] Becker et al (2005), for example, present a model suggesting that some level of inequality in the distribution of income is preferred to equal distribution.

[v] A variety of political theories also address the impacts of inequality. These theories, reviewed in Alesina and Perotti (1994), highlight the importance of rent-seeking, and political and fiscal instability, all hypothesize an inverse relation between inequality and growth.

[vi] Another frequently discussed link between inequality and growth involves imperfect capital markets. Imperfect information, limited collateral, and poor contract enforcement prevent the poor from accessing capital markets, reducing investment, entrepreneurship, and growth (Debraj Ray, 1993). The inability of the poor to obtain credit is especially detrimental because, as a consequence of their low incomes and diminishing marginal returns, their investments are theoretically more productive than those of wealthier persons (Roland Benabou, 1996b).

[vii] One of us (Light, 2010) has explored the growth literature as well, and in an unpublished analysis found results suggesting positive impacts from rising top shares following relatively long lag periods.

[viii] Norway and Ireland are both omitted from the analysis, as the observed increases in low-incomes in Norway are attributable to oil, and in Ireland because of a massive infusion of foreign investment (Kenworthy, 2010, 99).

[ix] This calculations assume that the historic long-term (from 1960 to 2009) average 2.3 percent annual increase in real per-capita income continues for the next 75 years. Frank's (2009) key finding is that a 2 SD increase in the top 10% share of income raises growth rate of real per-capita personal income by 0.072%. In 1890, the top 10 share averaged 31.4% and the SD was 1.5). Using Frank's finginds, we model the impact of the top 10% share rising to 34.4%, which causes the annual growth rate to rise to 2.372 percent.

[x] Alternate definitions of middle and low-income, varying the starting and ending percentiles of the group, but these alternatives do not appreciably impact the findings. Groups are identified each year based on the state-level distribution of either family income or total family earnings.

[xi] The coefficients of interest can be read as saying "a ten-percent increase in the top-income share leads to an _X_ percent increase in the average income of middle-income families."

[xii] Alterative covariates to capture cyclical economic fluctuations were also explored, specifically the annual employment growth rates, but did not alter the findings. Also, the sign remains negative when the industry composition covariates are excluded.

[xiii] Because the question of interest in this paper is impacts on standard of living, the income used in the analysis has been adjusted for inflation using the US CPI-U. This inflation-adjustment affects the results presented in Columns 1 through 5, but not columns 6 and higher. The year effect added in Column 6 effectively wipes out the inflation-adjustment.

[xiv] Results of a Hausman test on the specification in Appendix Table 4, Column 8 reject the use of Random Effects ($Chi^2 = 141$, $Prob > Chi^2 = 0.0$).

[xv] Alternative classifications of "low-income" explored include 5th through 30th percentile and 5th through 35th percentile. Alternative classifications of "middle-income" include 35th through 75th percentile and 40th through 75th percentile.

[xvi] See the unionstats.com website of Barry Hirsch and David MacPherson for union coverage data over time.

[xvii] The case for the impact of these factors on inequality is laid out in Schmitt (2009).

[xviii] CEO pay is the combined top five executive compensation as a share of firm net earnings.