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Growth, Inequality and Economic Freedom: Evidence from the US States

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Abstract: This paper returns to the discussion of how income inequality affects economic growth. The main argument of the paper is that economic freedom is likely to mediate the association between inequality and growth. In a panel of 300 observations from six five-year periods across the 50 US states, I employ five different measures of inequality. The results show that across measures, the growth effects of inequality turn more positive with more economic freedom. The moderating effects are mainly driven by measures of public sector consumption. (JEL O11, O38, O43, P48)

I. INTRODUCTION

In recent years, discussions about the desirability of income equality have returned to the international debate. While the political debate has roots back to the work of Ricardo and Marx in the 19th century, modern studies of the inequality-growth nexus appearing since the early 1990s have in general reported very mixed evidence.¹ However, recent studies from the IMF and the OECD have reopened the international debate about the long-run effects of income inequality by claiming that the association is negative (Cingano, 2014; Ostry et al., 2014). Many commentators have claimed that the financial crisis and the Great Recession that began in 2008 is related to growing inequality in parts of the world, and in the US in particular, and that growing inequality increased the risk of a crisis. Piketty (2014) for example echoes Marx by arguing that modern growth is immiserizing because it implies that a growing share of total income is captured by rich elites of capital owners. Stiglitz (2009) even argues that inequality caused the crisis. Both explicitly call for increased redistribution and substantial government control and regulation to bring down levels of inequality.

Yet, such proposals contain a two-fold economic paradox. Although they may or may not cause inequality to decrease, they necessarily entail significantly reduced economic freedom. The first part of the paradox arises because a substantial literature documents that reduced economic freedom is associated with substantially lower growth (Hall and Lawson, 2014). In other words, the *political* response to increased high levels of inequality that are claimed to cause

¹ Studies since the early 1990s include Galor and Zeira (1993) and Perotti (1993) who suggested that inequality is negatively associated with long-run economic growth. Yet, following the first cross-country panel studies by Barro (2000) and Forbes (2000), most studies have provided mixed evidence by exhibiting either no relation at all, weakly positive effects or conditional relationships (Banerjee and Duflo, 2003; Voitchovsky, 2005; Bjørnskov, 2008).

low growth, may in itself affect long-run growth negatively. Second, the effects of inequality may arguably be moderated by regulatory or redistributive economic policies. In order to assess the effects of income inequality, it is therefore necessary to also account for the consequences of policies that affect economic freedom. This paper is the first to directly address this apparent paradox and estimate how the growth effects of income inequality may be conditional on economic freedom.

Specifically, instead of searching for an overall, catch-all relation, a combined reading of the theoretical literatures suggests that any association between inequality, growth and economic policy may be conditional. First, the associations between economic growth, income inequality, and economic freedom do not appear as simple as indicated by Stiglitz and others. Empirical studies suggest that economic freedom may affect inequality in different ways, depending on overall economic development, other institutional characteristics and the specific measure of inequality (Berggren, 1999; Bergh and Nilsson, 2010; Bennett and Nikolaev, 2015; Heller and Stephenson, 2014; Hoover et al., 2015). However, the cross-country growth literature also shows clear support for the positive effects of economic freedom on long-run growth (Hall and Lawson, 2014). Focusing on differences across the 50 US states, as I also do in the following, Ashby and Sobel (2008) find that changes in economic freedom in the US states are significant drivers of long-run economic growth while also reducing income inequality. Compton et al. (2011) likewise find that economic freedom contributes to economic growth across US states, and show that expenditure components of the economic freedom index tend to drive the results.

Yet, even within the US, the association between economic freedom and growth differs systematically across states. The heterogeneity is echoed by a growing cross-country literature that argues that the effects of economic freedom on growth are conditional on other institutional

features (cf. Justesen and Kurrild-Klitgaard, 2013; Justesen, 2014). A similar pattern arises in the literature on inequality and growth. Frank (2009) for example employs different measures of income inequality and shows a significant and positive long-run association with growth in an analysis of growth across the US states since 1945, which nonetheless differs across measures. Several cross-country studies also find differential or conditional effects of inequality on growth (Banerjee and Duflo, 2003; Bjørnskov, 2008; Bennett and Vedder, 2013).

The aim of this paper is therefore to combine the literatures on inequality and economic freedom and ask if the association between inequality and growth is moderated by economic freedom. The results of estimating determinants of growth across the US states between 1981 and 2011, using five different measures of income inequality sensitive to changes in different parts of the income distribution, suggest that inequality is particularly positively associated with growth in states with substantial freedom from government intervention. The specific component of economic freedom that appears to moderate the effects of inequality is the size of government.

The rest of the paper is structured as follows. Section II outlines a set of theoretical considerations of how economic freedom may moderate the relation between inequality and growth. Section III describes the data and estimation strategy used in sections IV and V. Section VI concludes and discusses directions for future research.

II. THEORETICAL CONSIDERATIONS

The theoretical literature on the inequality-growth nexus includes many different potential mechanisms, and developed over the years in roughly four phases. This long literature argues that inequality may be beneficial to growth, detrimental to growth, affect it in non-linear ways and influence growth conditionally on other factors (see surveys in Aghion et al., 1999; de

Dominics et al., 2008; Neves and Silva, 2014). However, at the most basic level, inequality can affect economic growth through three channels: capital investments, effective labor supply, and aggregate productivity.

Kaldor (1955) was one of the first to hypothesize directly on the association between income inequality and longer-run growth. Starting from the workhorse growth model of the day, the Harrod-Domar model, Kaldor focused on how inequality affects the overall savings rate, and thereby the long-run *investment rate*. Arguing that richer people on average have higher marginal propensities to save, because they spend smaller shares of their income on necessities, Kaldor found that redistribution towards poorer segments of society is likely to reduce the savings rate and, consequently, the equilibrium growth rate. In his view, the association between inequality and growth must therefore be positive while effective redistributive government policies are negatively associated with growth through two mechanisms that reduce the savings rate: 1) reduced inequality negatively affects the aggregate private savings rate; and 2) larger government consumption redistributes income from private agents with a positive marginal propensity to save to government agents with a small or no propensity to save. Recent empirical studies have vindicated Kaldor by indicating that inequality is more strongly related to savings rates when the financial sector is developed (Koo and Song, 2016).

However, with the advent of the Solow-Swan model and the later decline of interest in growth theory in the 1960s, interest in the field also waned. A second theoretical wave instead originated in Mirrlees's (1971) work on optimal tax theory, which argued that wage and income differences affect *labor supply* by providing incentives to work longer and more efficient hours. As such, with relatively increasing income differences, i.e. higher inequality, overall labor supply should increase. Conversely, redistributive policies aimed at lowering inequality can

affect labor supply negatively (Pedersen and Smith, 2002). More recent studies have followed this logic in arguing both for labor supply effects, but also more importantly that redistributive policy in general affects both labor supply and entrepreneurial activity. Several studies for example find that large government consumption and taxation reduces entrepreneurial activity (Henrekson, 2005; Kreft and Sobel, 2005; Nyström, 2008; Bjørnskov and Foss, forthcoming). The evolving field of entrepreneurship studies thus connects reduced economic freedom to subsequently reduced productivity growth, but primarily through policy responses to inequality (cf. Boudreaux, 2014).

A third wave of theoretical arguments deriving from the revival of growth theory in the early 1990s indeed focuses on policy responses to inequality. A main argument in this line of research originates in the influential work of Persson and Tabellini (1992) and Perotti (1993), who noted that increasing inequality in almost all cases causes the income of the average voter to move away from that of the median voter. The median voter will therefore rationally demand more redistributive policy in the form of progressive taxes and more extensive transfer schemes, which changes the incentive structure. This change can cause growth to decline as both investment activity, work effort, and labor supply decrease (cf. Kaldor, 1955; Mirrlees, 1971). Yet, in this particular type of theory, inequality is *negatively* associated with growth when it is accompanied by redistributive policies and larger government consumption. In a particular US context, it may also imply reduced labor supply at the state level, when particularly successful individuals move to other states with tax and transfer policies that are more beneficial to them (Ashby, 2007).

A fourth wave of theoretical development followed that argues that effects of inequality on growth are conditional. In one of the first contributions to this wave, Banerjee and Duflo (2003)

found an inverted U-shaped association between inequality and growth. Their interpretation was that at low levels of inequality, redistributive policies undermine work incentives. At particularly high levels typical of low to middle-income countries, conversely, inequality is associated with social unrest and low human capital investments (as in Perotti, 1993; Persson and Tabellini, 1994). Banerjee and Duflo consequently argued that growth on average is fastest at intermediate levels of inequality and the effects of inequality thus depend on the level of development. Bjørnskov (2008) instead argued that the effects of inequality must rest on the policies actually introduced or in place to counter changes in inequality, and that these policies cannot easily be inferred from the simple position of the median voter. Changes in inequality may therefore either cause declining growth, when accompanying policies are redistributive and increase government consumption and regulation, or higher growth when economic freedom remains strong and dynamic incentives to work, invest or innovate remain.

The single element common to most theories connecting income inequality to subsequent investment, labor supply, entrepreneurial activity and productivity growth is that the consequences of income inequality are likely to depend on government policies. The effects of inequality and policies are thus likely to be heterogeneous, as argued by Wiseman (forthcoming), but in a particularly systematic way. Specifically, government consumption, taxation and regulations, that all capture elements of redistributive policy and belong within the umbrella concept of economic freedom, are theoretically relevant as moderators of the effects of inequality.

As such, the testable hypotheses arising out of these theoretical considerations are that most (if not all) effects of income inequality ought to be moderated by economic freedom. In particular, increasing income inequality accompanied by policies consistent with economic

freedom – limited government consumption, limited redistributive policies, low taxes, and easy regulatory burdens – are more likely to be positively related to economic growth. Furthermore, theory and existing studies indicate that the effects of income inequality on economic growth *through* labor supply and investments ought to be clearly moderated by government consumption and taxation, while effects running through entrepreneurial activity and productivity may be moderated by several types of policy not restricted to consumption and taxation decisions.

III. DATA AND EMPIRICAL STRATEGY

To test if the overall hypothesis is consistent with actual economic development, I draw on data from three decades of growth across the 50 US states between 1981 and 2011. The benefit of doing so is that central political and judicial institutions are either identical or very similar across the states, such that direct comparisons can be made. The data are also more comparable, collected by the same organizations with the same definitions and all available since 1980. While the use of a US state panel precludes any study of policies and institutions decided upon at the federal level such as monetary policy, trade policy and most judicial and regulatory policy, the benefits of the substantial comparability of data and institutional contexts are significant compared to cross-country studies. Furthermore, US states have considerable control over government consumption, taxation decisions, labor market regulations and other elements of theoretically relevant welfare state policies.

Throughout the paper, I use one of five measures of income inequality, four of which derive from Mark Frank’s comprehensive dataset of US state-level income inequality data and a fifth from the Frank-Sommeiller-Price series of top incomes in the US (Frank, 2014, 2015; Frank et al., 2015). All of the measures are constructed from individual tax filing data from the US

Internal Revenue Service and are therefore less subject than other data to, for example, well-known problems of changing household structures (Daly and Valetta, 2006).²

The measures included in the paper are first Gini coefficients, as in most of the literature, and, second, the relative mean deviation of income. Three alternative measures include the share of the total state income earned by the 10 % richest (the Top 10 income share), and two general entropy indicators: the Atkinson and Theil indices. The Atkinson index uses an inequality aversion parameter of 0.5, making it more sensitive to changes at the upper end of the income distribution than other inequality measures. As the particular Theil index is the T index, which is also more sensitive to changes at the tails of the income distribution, the Atkinson, Theil and Top 10 measures are likely to capture somewhat different developments in the income distribution.

That the different measures tend to pick up different developments can also be observed in the simple correlations between the five measures, which rank between 0.97 (the correlation between the Atkinson and Theil indices) and 0.74 (between the Gini coefficient and the Top 10 income share). The pure within-state correlations (correlations across the variables with state-specific means subtracted) that purge any joint US development further underline the value of using different measures as the correlations range between 0.86 (again the Atkinson and Theil indices) and a mere 0.33 (the Atkinson index and Gini coefficients). In general, Gini coefficients and the relative mean deviation tend to capture very similar developments while the Atkinson and Theil indices and the Top 10 share capture somewhat different changes to the income

² The IRS data are not affected by changes in how many people live on their own, how many children they get or how likely they are to ignore surveys. However, as pointed out by a referee, changes in marriage frequency may still affect them, when a couple marries and subsequently files a joint tax return.

distribution.³ An important difference between the first two measures and the latter three measures thus is how sensitive they are to changes in either the middle incomes, as the Gini and relative mean deviation, or the tails and particularly the upper part of the distribution, as the Theil or Atkinson indices and the Top 10 (Haughton and Khandker, 2009).

Next, to capture economic freedom, I follow a growing literature in using the Economic Freedom of North America (EFNA) indices. The EFNA index is introduced and maintained by the Fraser Institute and consists of three subindices, available for the 31 years between 1981 and 2011 for all 50 states: 1) the size of government, composed of general government consumption expenditure (% of GDP), total provincial transfers and subsidies (% of GDP), and social security payments (% of GDP); 2) the tax structure, measured as an index equally weighing tax revenue (% of GDP), the top marginal tax rate and its applied income threshold, indirect tax revenue (% of GDP) and sales taxes (% of GDP); and 3) labor market freedom, measured as the extent of minimum wage legislation, government employment (% of total provincial employment) and union density (Stansel and McMahon, 2013). With the possible exception of union density, these measures are under the direct control of state governments, and thus subject to democratic political decisions.⁴ I use both the overall index and follow standard practice and disaggregate the index into its three subindices.

³ Comparing measures even at the federal level reveals substantial differences. While inequality, as measured by either the Gini coefficient or the relative mean deviation, decreased during the Great Recession from 2007 to 2011 by about one percent, the Atkinson measure increased by nine percent and the Theil measure by 11 percent.

⁴ Although union density is a consequence of personal choice in some states, it is affected by right-to-work and closed shop legislation in several states. As such, government can mandate union membership in certain sectors and therefore has some influence over union density.

Both economic freedom and the five inequality measures are somewhat differently distributed, which makes it difficult to compare estimates. I therefore rescale all five inequality measures as well as the indices of economic freedom; all are rescaled to a 0-10 scale by subtracting the sample minimum, dividing with the distance between the sample maximum and minimum and multiplying by ten. As such, in all tables in the following, the effect sizes can be compared directly across measures in the tables. I further create three dummies for each economic freedom index as a flexible way to account for potential non-linear effects and avoid mistaken inferences from the assumption of linear heterogeneity (cf. Hainmueller et al., 2016). These dummies denote economic freedom observations belonging in the second, third and fourth quartiles of the distribution; the comparison group is always the bottom quartile and thus the lowest economic freedom.

In the following, I therefore estimate versions of equation 1) where $GROWTH_{i,t}$ is the five-year average growth rate of purchasing-power adjusted personal income, $X_{i,t}$ is a vector of control variables for state i in period t ; $EF_{i,t}$ is economic freedom for state i in period t ; $INEQ_{i,t}$ is income inequality for state i in period t , represented by either one of the five measures or one of five corresponding vectors of three quartile dummies; $EF * INEQ$ is an interaction; and $\eta_t + \mu_i$ are period and state fixed effects and ε is an error term. The interaction term thus accounts for any systematic heterogeneity as hypothesized in Section II.

$$(1) \quad GROWTH_{i,t} = \alpha + \beta_j X_{i,t} + \gamma EF_{i,t} + \delta INEQ_{i,t} + \zeta EF_{i,t} * INEQ_{i,t} + \eta_t + \mu_i + \varepsilon$$

In order to be able to account for effects through all relevant transmission channels, I keep the baseline parsimonious.⁵ The control variables first include the lagged logarithm to average

⁵ While the cross-country literature often includes labor participation, investment rates (domestic and foreign direct), economic structure and productivity measures, we refrain from doing so. A practical reason is that these data, with

personal income, derived from the BEA. This inclusion occurs both because not all five inequality measures are scale invariant, and to capture well-known convergence effects in growth (Barro, 1991). As Table 1 describes, this yields a balanced panel of 300 observations from six five-year periods across the 50 US states in the period 1981-2011. I employ a generalized least squares estimator with two-way fixed effects – for time periods and states – in order to control for joint business cycle and federal policy trends and for approximately time-invariant state differences such as geography, culture and political traditions.

Table 1 about here

The control variables in addition include a number of variables that might be simultaneously associated with growth, income inequality and economic freedom and thus, if not included, may cause omitted variables bias. As inequality and economic freedom are the main variables in the following, this is necessary to solve the problem that changes in inequality as well as changes in economic freedom may derive from underlying structural changes in the economy that could in principle be correlated with the growth rate and cause simultaneity bias (Aspergis et al., 2014). The additional control variables include age structure, captured as the shares of the population that are above 65 or below 15 years of age and thus outside the normal working age, the ethnic structure of the population by including the share that is of Black or Hispanic origins, the logarithm to population size, and violent crimes per 1000 inhabitants. These data all derive from the BEA and the US Census except violence statistics, which derive from FBI (2013) and are included as Bjørnskov (2015) finds a strong negative association between

the exception of the participation and some structural measures, are not available as a panel for the US states. Their inclusion would also capture theoretically relevant transmission mechanisms and thus result in estimates of only a partial effect.

economic freedom and crime across the US states. I also include the farm share of state income, as long-run growth tends to be associated with a rural-urban transition that may also affect measured income inequality and thus create a spurious association.⁶

Interpreting marginal effects of inequality also represents a potential problem. I note that they always are conditional on the level of economic freedom, such that the marginal effect of any change of inequality is given by $\delta + \zeta EF_{i,t}$. In all cases, I make sure to interpret interactions symmetrically and with correct conditional standard errors, as calculated by the delta method (Brambor et al., 2006).

A final problem is the perennial worry of endogeneity bias, as differences in income inequality may arguably be caused by long-run growth differences (cf. Kuznets, 1955). While the pure estimates on both inequality and economic freedom may suffer from endogeneity bias, it is still possible to draw limited causal inference in this setting. The reason is the use of interactions, which Nizalova and Murtazashvili (2016) show alleviates the standard concern under fairly general conditions. As a consequence of controlling directly for the main effects of the

⁶ Violence data are included for two reasons. First, they serve as rough proxies for the quality of judicial institutions. Second, Bjørnskov (2015) finds a strong negative association between economic freedom and crime across the US states, which could in principle lead to bias. The farm share of income enters for similar reasons. A rural-urban transition in development economics is most often described as poor people moving to cities and thus increasing measured income inequality in urban areas as they enter with incomes that are higher than in rural areas, but substantially below the median urban income. However, part of the transition may also include the monetization of certain goods and services that are paid ‘in kind’ in rural areas, but performed as market transactions in urban areas. This problem makes rural areas appear ‘too’ poor and thus biases inequality measures. It is likely to bias the measures in the present sample as the relative size of the farm sector decreased by more than 50 % in the period in question here. In additional tests in an online appendix, I also add the mining and manufacturing shares of state GDP in order to control for the effects of broader structural change.

potentially endogeneous variables, the *heterogeneity* of the inequality estimate can be considered exogenous (Nunn and Qian, 2012; Dreher et al., 2015). The intuition behind the result is that while a particular estimate – most easily illustrated by a regression line in a figure – may be biased either up or downwards, its interaction with some other variable is not affected by bias shifting its average up or down but retaining its slope. As such, there is no reason to expect a *systematic* bias for the interaction, which is the particular result of interest in the following.

In a set of additional tests, I nevertheless partially alleviate the standard endogeneity concern by lagging the inequality measures a five-year period. While this is not an ideal way of dealing with endogeneity concerns, not least due to the relatively slow movements of inequality over time, it is a practical solution in the absence of any non-policy related, valid instrumental variables with sufficient within-state variance.⁷

IV. MAIN RESULTS, OVERALL ECONOMIC FREEDOM

The overall results are presented in Table 2 where the estimates show convergence effects (the lagged income), effects of changing age structure and faster growth in states with slower population growth. Changes in the farm share of total income, the ethnic profile of the population or violence are, conversely, not robustly associated with growth. The results also indicate that economic freedom is consistently positively associated with growth as evaluated at average or median inequality.

⁷ The problem of finding instrumental variables in settings with country or state fixed effects is well known. In inequality studies in particular, the relative persistence of inequality over time presents a special problem, as virtually all candidates for instruments with variation across time – immigration, ethnic composition, and various policy measures – are also valid candidates for independent factors affecting economic growth. By using lagged values, one can at least be sure that the observed inequality predates the growth rate.

Table 2 about here

The main finding is that regardless of the measure of inequality, the heterogeneity of the inequality effect is always significant, precisely measured and quantitatively similar across inequality measures. The results nevertheless also show that the association between inequality and growth evaluated at the lowest levels of economic freedom (normalized to zero) differ dramatically across the five measures. Using Gini coefficients or the relative mean deviation suggests that the association is negative at very low levels, although it turns insignificant at the 25th percentile (the upper bound of the first quartile in the lower panel of the table). Using the Atkinson, Theil and Top 10 measures indicates a positive association across all levels of economic freedom that is nevertheless significantly increasing in economic freedom.

The very different effects at low levels of economic freedom may be due to two problems: different degrees of endogeneity bias across measures; or that the measures are sensitive to changes in different parts of the income distribution. The significantly negative effects may, however, also be due to the rather strong assumption that the interaction is perfectly linear. The specification in Table 3 therefore relaxes that assumption by including economic freedom categorized in four quartiles that are interacted with inequality; the baseline comparison is therefore the quartile with the least economic freedom.

Table 3 about here

The conditional estimates reported in the lower panel of the table clearly support a non-linearly heterogeneous association, as all estimates of the growth-inequality association are significantly larger in the fourth quartile of economic freedom. In quantitative terms, the estimates nonetheless differ substantially measures, with the Gini and relative mean deviation measures indicating a change of approximately 40 % of a standard deviation when inequality

changes one standard deviation in an environment of substantial economic freedom. Using any of the three alternative measures, a one standard deviation change in inequality is associated with roughly one standard deviation change in the growth rate. However, the *difference* between the size of the inequality estimate in the middle quartiles of economic freedom and that in the top quartile is approximately 0.3 across all measures. This difference is directly comparable as all measures are re-scaled to the same scale. As such, the part of the association that can be interpreted causally appears very consistently estimated across the five inequality indicators.

V. RESULTS, SPECIFIC COMPONENTS OF ECONOMIC FREEDOM

The EFNA measure of economic freedom nevertheless consists of three subindices: government consumption, taxation and labor market policy. As often with economic freedom indices, it is therefore an open question which elements of the overall index are driving the main results (cf. Heckelman and Stroup, 2005; Rode and Coll, 2012). I address this question in Tables 4-6 in which I replace the categorized full EFNA index with the three similarly categorized subindices. Otherwise, the specification (not shown) remains the same as in Table 2.

Table 4 about here

Table 5 about here

Table 6 about here

The results of replacing the overall index of economic freedom with its subindices indicate that the main results are driven by the government consumption component in Table 4. In other words, there is little evidence that the effects of inequality are heterogeneous in tax policy (Table 5) and only very mixed evidence of heterogeneity in labor market policy (Table 6).

Further tests suggest that the heterogeneity results pertaining to government consumption are very robust. Tests excluding extreme observations, operationalized as the tails of the distributions of inequality, economic freedom and growth, support the main findings. Full state and period jackknife tests also render the central estimates robust. In addition, directly controlling for labor market participation and structural changes to the state economy, as captured by GDP shares of the agriculture, manufacturing and mining industries, indicates that only part of the effects can be explained through these particular transmission mechanism.⁸

As the main estimates appear robust, a final concern is endogeneity. While the interactions can arguably be interpreted causally, the main effects and thus – in principle – the average effects may be subject to bias. In the absence of valid instruments, I instead lag the inequality measures one five-year period. The results reported in Table 7 first of all show that the interaction terms associated with the fourth quartile of economic freedom, i.e. high levels of freedom, are slightly but not significantly larger than the corresponding estimates in Table 3. The estimates using the Atkinson, Theil and Top 10 measures at low levels of economic freedom are small and insignificant when inequality is lagged, which is consistent with endogeneity bias in the pure estimates in Tables 3-6. Yet, the stability of the interaction terms illustrates how the estimates of coefficient heterogeneity are unbiased (cf. Nizalova and Murtazashvili, 2016).

Table 7 about her

More importantly, to the extent that lagging alleviates any endogeneity bias, these final results provide further indications that the inequality estimates at high levels of economic freedom can be interpreted as causally positive. The results thus suggest that income inequality is

⁸ All of these robustness tests and additional tests are reported in an appendix that is available upon request.

likely to be beneficial to economic growth when governments do not enact policies to strongly counter income differences. With this final observation, I proceed to discuss and conclude.

VI. CONCLUSIONS

Both the international and the US debates about income inequality have returned in recent years. Influential claims from the IMF, among others, that inequality is detrimental to growth guide policy discussions in many countries. These discussions nevertheless tend to mask the substantial disagreement in the research literature and ignore that the inequality-growth nexus arguably is conditional on particular factors such as welfare policies. This paper contributes to the empirical foundation of such discussions by estimating the growth effects of income inequality across the US states. Specifically, I allow the growth effects of inequality to vary with state-level economic freedom measures that capture essential differences in welfare state policies.

The results of estimating medium-run growth determinants across the 50 US states between 1981 and 2011 show that the association between inequality and growth indeed appears to be conditional: the higher the level of economic freedom is in a state, the more likely is it that income inequality contributes positively to economic growth. Further tests suggest that the moderating factor consists of government consumption expenditure, state-level transfers and subsidies, and social security payments. Conversely, elements of economic freedom associated with tax policy or labor market regulations are not robustly associated with the inequality-growth relation. In addition, interaction results should be interpreted symmetrically, and although the evidence for growth effects of economic freedom is hardly wanting, the results in this paper suggest that effects of freedom at very low levels of inequality may be rather small (Doucouliagos, 2005; Hall and Lawson, 2014).

Both observations suggest that the discussion whether or not income inequality and economic freedom affects growth might be misleading, if it is more the question *under which conditions* their beneficial effects are likely to occur. The evidence here indicates that the incentive effects of income differences and welfare state policies mainly occur when the policy framework is not actively set up to counteract those incentives. The results thus also indicate that the cross-country evidence of inequality consequences may be mixed for a particular reason, if effects depend on policy or institutional factors.

Overall, however, the results may also be taken to indicate that the costs of building a welfare state are larger than the mere financial and bureaucratic costs of larger government consumption. Substantial public provision of both public and private goods may not only crowd out other activity, but also effectively undermine regular economic incentives and entrepreneurial activity. Allowing free market forces to work in an environment of tolerable institutions may still provide the best policy environment for rapid growth and opportunities for all groups, regardless whether or not they are favored by the political elite.

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REFERENCES

- Aghion, P., E. Caroli, and C. Garcia-Peñalosa. "Inequality and Economic Growth: The Perspective of the New Growth Theories." *Journal of Economic Literature* 37, 1999, 1615–1660.
- Apergis, N., O. Dincer, and J.E. Payne. "Economic Freedom and Income Inequality Revisited: Evidence From a Panel Error Correction Model." *Contemporary Economic Policy* 32, 2014, 67-75.
- Ashby, N.J. "Economic Freedom and Migration Flows between U.S. States" *Southern Economic Journal* 73, 2007, 677-697.
- Ashby, N.J., and R.S. Sobel. "Income Inequality and Economic Freedom in the U.S. States." *Public Choice* 134, 2008, 329–346.
- Banerjee, A.V., and E. Duflo. "Inequality and Growth: What Can the Data Say?" *Journal of Economic Growth* 8, 2003, 267–299.
- Barro, R.J. "Economic Growth in a Cross Section of Countries." *Quarterly Journal of Economics* 106, 1991, 407-443.
- Barro, R.J. "Inequality and Growth in a Panel of Countries." *Journal of Economic Growth* 5, 2000, 5–32.
- Bennett, D.L., and B. Nikolaev. "On the Ambiguous Economic Freedom-Inequality Relationship." Working paper, Patrick Henry College, 2015.
- Bennett, D.L., and R.K. Vedder. "A Dynamic Analysis of Economic Freedom and Income Inequality in the 50 US States: Empirical Evidence of a Parabolic Relationship." *Journal of Regional Analysis and Policy* 43, 2013, 42-55.
- Berggren, N. "Economic Freedom and Equality: Friends or Foes?" *Public Choice* 100, 1999, 203-223.

- Bergh, A., and T. Nilsson. "Do Liberalization and Globalization Increase Income Inequality?" *European Journal of Political Economy* 26, 2010, 488-505.
- Bjørnskov, C. "The Growth-Inequality Association: Government Ideology Matters." *Journal of Development Economics*, 87, 2008, 300-308.
- Bjørnskov, C. "Does Economic Freedom Really Kill? On the Association Between 'Neoliberal' Policies and Homicide Rates. *European Journal of Political Economy* 37, 2015, 207-219.
- Bjørnskov, C., and N. J. Foss. "Institutions, Entrepreneurship, and Economic Growth: What Do We Know? And What Do We Still Need to Know?" *Academy of Management Perspectives*, forthcoming.
- Boudreaux, C.J. "Jumping Off of the Great Gatsby Curve: How Institutions Facilitate Entrepreneurship and Intergenerational Mobility." *Journal of Institutional Economics* 10, 2014, 231-255.
- Brambor, T., W.R. Clark, and M. Golder. "Understanding Interaction Models: Improving Empirical Analysis." *Political Analysis* 14, 2006, 63–82.
- Cingano, F. "Trends in Income Inequality and its Impact on Economic Growth." OECD Social, Employment and Migration Working Papers no. 163, 2014.
- Compton, R.A., D.C. Giedman, and G.A. Hoover. "Panel Evidence on Economic Freedom and Growth in the United States." *European Journal of Political Economy* 27, 2011, 423-435.
- Daly M.C., and R.G. Valetta. 2006. "Inequality and Poverty in United States: The Effects of Rising Dispersion of Men's Earnings and Changing Family Behaviour." *Economica* 73, 2006, 75-98.

- de Dominics, L., R.J.G.M. Florax, and H.L.F. de Groot, H.L.F. "A Meta-Analysis on the Relationship between Income Inequality and Economic Growth." *Scottish Journal of Political Economy* 55, 2008, 654-682.
- Doucouliafos, H. "Publication Bias in the Economic Freedom and Economic Growth Literature." *Journal of Economic Surveys* 19, 2005, 367–87.
- Dreher, A., A. Minasyan, and P. Nunnenkamp. "Government Ideology in Donor and Recipient Countries: Does Political Proximity Matter for the Effectiveness of Aid?" *European Economic Review* 79, 2015, 80-92.
- FBI. *Crime in the United States, Editions 1981–2011*. Washington DC; Federal Bureau of Investigation, 2013.
- Forbes, K.J. "A Reassessment of the Relation between Inequality and Growth." *American Economic Review* 90, 2000, 869–887.
- Frank, M.W. "Inequality and Growth in the United States: Evidence from a New State-Level Panel of Income Inequality Measure." *Economic Inquiry* 47, 2009, 55-68.
- Frank, M.W. "A New State-Level Panel of Annual Inequality Measures over the Period 1916 – 2005." *Journal of Business Strategies* 31, 2014, 241-263.
- Frank, M.W. *U.S. State-Level Income Inequality Data*. Online database, available at http://www.shsu.edu/eco_mwf/inequality.html (accessed October 2015).
- Frank, M.W. E. Sommeiller, M. Price, and E. Saez. "Frank-Sommeiller-Price Series for Top Income Shares by US States since 1917." Working paper, Sam Houston State University, 2015; available at http://www.shsu.edu/eco_mwf/inequality.html (accessed October 2015).
- Galor, O., and J. Zeira. "Income Distribution and Macroeconomics." *Review of Economic Studies* 60, 1993, 35-52.

- Hainmueller, J., J. Mummolo, and Y. Xu. “How Much Should We Trust Estimates from Multiplicative Interaction Models? Simple Tools to Improve Empirical Practice.” Working paper, Stanford University, 2016.
- Hall, J.A., and R.C. Lawson. “Economic Freedom of the World: An Accounting of the Literature.” *Contemporary Economic Policy* 32, 2014, 1-19.
- Haughton, J., and S.R. Khandker. *Handbook on Poverty and Inequality*. Washington DC: the World Bank, 2009.
- Heckelman, J.C., and M.D. Stroup. “A Comparison of Aggregation Methods for Measures of Economic Freedom.” *European Journal of Political Economy* 21, 2005, 953–956.
- Heller, L.R., and E.F. Stephenson. “Economic Freedom and Labor Market Conditions: Evidence from the States.” *Contemporary Economic Policy* 32, 2014, 56-66.
- Henrekson M. “Entrepreneurship: A Weak Link in the Welfare State? *Industrial and Corporate Change* 14, 2005, 437–467.
- Hoover, G.A., R.A. Compton, and D.C. Giedman. “The Impact of Economic Freedom on the Black/White Income Gap.” *American Economic Review* 105, 2015, 587-592.
- Justesen, M.K. “Better Safe than Sorry: How Property Rights and Veto Players Jointly Affect Economic Growth.” *Comparative Politics* 46, 2014, 147-167.
- Justesen, M.K., and Kurrild-Klitgaard, P. ”Institutional Interactions and Economic Growth: The Joint Effects of Property Rights, Veto Players and Democratic Capital.” *Public Choice* 157, 2013, 449-474.
- Kaldor, N. “Alternative Theories of Distribution.” *Review of Economic Studies* 23, 1955, 83–100.

- Koo, J., and Y. Song. “The Relationship between Income Inequality and Aggregate Saving: An Empirical Analysis using Cross-Country Panel Data.” *Applied Economics* 48, 2016, 892-901.
- Kreft, S.F., and R.S. Sobel. “Public Policy, Entrepreneurship, and Economic Freedom.” *Cato Journal* 25, 2005, 595-616.
- Kuznets, S. “Economic Growth and Income Inequality.” *American Economic Review* 45, 1955, 1-28.
- Mirrlees, J.A. “An Exploration in the Theory of Optimum Income Taxation.” *Review of Economic Studies* 38, 1971, 175-208.
- Neves, P.C., and S.M.T. Silva. “Inequality and Growth: Uncovering the Main Conclusions from the Empirics.” *Journal of Development Studies* 50, 2014, 1-21.
- Nizalova, O.Y., and I. Murtazashvili. “Exogenous Treatment and Endogenous Factors: Vanishing of Omitted Variable Bias on the Interaction Term.” *Journal of Econometric Methods* 5, 71-77.
- Nunn, N., and N. Qian. “Aiding Conflict: the Impact of U.S. Food Aid on Civil War.” NBER working paper 17794, 2012
- Nyström, K. “The Institutions of Economic Freedom and Entrepreneurship: Evidence from Panel Data.” *Public Choice* 136, 2008, 269-282.
- Ostry, J.D., A. Berg, and C.G. Tsangarides. “Redistribution, Inequality, and Growth.” IMF Staff Discussion Note, February, 2014.
- Pedersen, P.J., and N. Smith. “Unemployment Traps: Do Financial Disincentives Matter?” *European Sociological Review* 18, 2002, 271-288.
- Perotti, R. “Political Equilibrium, Income Distribution, and Growth.” *Review of Economic Studies* 60, 1993, 755–776.

Persson, T., and G. Tabellini. "Growth, Distribution and Politics." *European Economic Review* 36, 1992, 593–602.

Persson, T., and G. Tabellini. "Is Inequality Harmful for Growth?" *American Economic Review* 84, 1994, 600–621

Piketty, T. *Capital in the Twenty-First Century*. Cambridge: Harvard University Press, 2014.

Rode, M., and S. Coll. "Economic Freedom and Growth. Which Policies Matter the Most?" *Constitutional Political Economy* 23, 2012, 95-133.

Stansel, D., and F. McMahon. *Economic Freedom of North America 2013*. Vancouver: the Fraser Institute, 2013.

Stiglitz, J.E. "The Anatomy of a Murder: Who Killed America's Economy?" *Critical Review* 21, 2009, 329-339.

Voitchovsky, S. "Does the Profile of Income Inequality Matter for Economic Growth? Distinguishing Between the Effects of Inequality in Different Parts of the Income Distribution." *Journal of Economic Growth* 10, 2005, 273-296.

Wiseman, T. "Economic Freedom and Growth in U.S. State-Level Market Incomes at the Top and Bottom." *Contemporary Economic Policy*, forthcoming 2016.

WEB SOURCES

US Bureau of Economic Analysis. Data available at <http://www.bea.gov/> (accessed July 2016).

US Census Bureau. Data available at <http://www.census.gov/> (accessed October 2015).

TABLE 1
Descriptive statistics

	Mean	Std. deviation	Minimum	Maximum
Growth rate	4.482	1.469	-1.278	8.544
Lagged log income	9.925	0.441	8.967	10.870
Farm share	1.205	1.512	-0.110	8.078
Over 65	0.119	0.019	0.029	0.178
Below 15	0.219	0.020	0.178	0.324
Black	0.100	0.094	0.003	0.374
Hispanic	0.069	0.085	0.005	0.465
Violent crime	4.538	2.260	0.569	11.382
Log population	15.009	1.012	13.060	17.416
Overall economic freedom	5.626	2.007	0	10
Economic freedom, area 1	5.931	1.833	0	10
Economic freedom, area 2	5.245	1.831	0	10
Economic freedom, area 3	5.451	1.939	0	10
Gini coefficient	4.953	1.809	0	10
Relative mean deviation	4.552	1.714	0	10
Atkinson index	3.359	1.823	0	10
Theil index	3.209	1.828	0	10
Top 10 income share	4.759	1.499	0	10

Note: all variables include 300 observations from the 50 US states.

TABLE 2
Main results, linear interactions

	Gini 1	Rel mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Lagged log income	-13.619*** (1.148)	-14.045*** (1.175)	-15.838*** (1.099)	-16.021*** (1.095)	-13.149*** (1.084)
Farm share	0.189 (0.133)	0.170 (0.131)	0.118 (0.122)	0.132 (0.121)	0.163 (0.126)
Over 65	-13.666 (10.349)	-16.487 (10.284)	-20.947** (9.459)	-19.805** (9.347)	-26.430*** (9.898)
Below 15	-32.826*** (7.531)	-34.308*** (7.566)	-32.753*** (6.678)	-26.169*** (6.650)	-35.329*** (6.982)
Black	-5.157 (7.992)	-6.864 (7.964)	-9.298 (7.357)	-7.363 (7.278)	-1.973 (7.699)
Hispanic	4.759 (4.518)	4.098 (4.472)	-3.452 (4.272)	-4.271 (4.233)	1.218 (4.272)
Violent crime	0.035 (0.066)	0.029 (0.069)	0.119* (0.064)	0.137** (0.064)	0.135** (0.068)
Log population	-3.804*** (0.865)	-3.905*** (0.866)	-3.079*** (0.802)	-2.959*** (0.789)	-3.661*** (0.818)
Economic freedom	-0.046 (0.076)	-0.066 (0.077)	-0.019 (0.062)	-0.016 (0.061)	-0.188* (0.101)
Inequality	-0.261*** (0.098)	-0.280*** (0.118)	0.303** (0.140)	0.341** (0.142)	0.137 (0.169)
Inequality * freedom	0.059*** (0.014)	0.069*** (0.016)	0.052*** (0.015)	0.043*** (0.016)	0.071*** (0.022)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.821	0.823	0.849	0.851	0.837
F statistic	67.23	68.06	81.92	83.82	75.07
Hausman Chi sq.	303.97***	402.19***	478.55***	580.70***	356.46***
Inequality at 1 st quartile	-0.112 (0.077)	-0.107 (0.094)	0.433*** (0.115)	0.449*** (0.111)	0.585*** (0.103)
2 nd quartile	0.038 (0.068)	0.065 (0.083)	0.563*** (0.097)	0.557*** (0.089)	0.627*** (0.104)
3 rd quartile	0.187** (0.077)	0.238*** (0.089)	0.693*** (0.093)	0.665*** (0.083)	0.655*** (0.106)
4 th quartile	0.337*** (0.099)	0.411*** (0.111)	0.823*** (0.104)	0.772*** (0.095)	0.682*** (0.108)

Note: * (**) [***] denote significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).

TABLE 3
Main results, non-linear interactions

	Gini 1	Rel mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Full baseline included					
EF 2 nd quartile	-0.399 (0.433)	-0.222 (0.422)	-0.229 (0.307)	-0.329 (0.292)	-0.934* (0.558)
EF 3 rd quartile	-0.463 (0.462)	-0.405 (0.452)	-0.162 (0.329)	-0.147 (0.315)	-0.551 (0.577)
EF 4 th quartile	-0.729 (0.574)	-0.773 (0.573)	-0.463 (0.423)	-0.436 (0.409)	-1.478** (0.747)
Inequality	-0.056 (0.106)	-0.006 (0.118)	0.545*** (0.127)	0.541*** (0.118)	0.423*** (0.151)
Inequality * 2 nd quartile	0.071 (0.088)	0.034 (0.094)	0.051 (0.087)	0.085 (0.083)	0.145 (0.115)
Inequality * 3 rd quartile	0.139 (0.092)	0.135 (0.097)	0.086 (0.090)	0.068 (0.088)	0.105 (0.123)
Inequality * 4 th quartile	0.313*** (0.113)	0.338*** (0.121)	0.293*** (0.109)	0.279*** (0.108)	0.377** (0.152)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.819	0.822	0.852	0.857	0.841
F statistic	52.27	53.04	65.95	68.93	60.94
Hausman Chi sq.	266.67***	348.77***	241.11***	248.18***	496.26***
Inequality at 1st quartile	-0.056 (0.106)	-0.006 (0.118)	0.545*** (0.127)	0.541*** (0.118)	0.423*** (0.151)
2nd quartile	0.015 (0.076)	0.028 (0.092)	0.596*** (0.106)	0.626*** (0.101)	0.568*** (0.118)
3rd quartile	0.083 (0.077)	0.129 (0.090)	0.631*** (0.093)	0.609*** (0.082)	0.528*** (0.105)
4th quartile	0.257*** (0.101)	0.332*** (0.112)	0.837*** (0.110)	0.821*** (0.102)	0.800*** (0.128)

Note: * (**) [***] denote significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).

TABLE 4
Area 1 results, non-linear interactions

	Gini 1	Rel mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Full baseline included					
EF 2 nd quartile	-0.566 (0.395)	-0.592 (0.385)	-0.415 (0.286)	-0.265 (0.281)	-0.281 (0.498)
EF 3 rd quartile	-0.546 (0.506)	-0.619 (0.472)	-0.511 (0.323)	-0.438 (0.318)	-0.509 (0.554)
EF 4 th quartile	-0.293 (0.529)	-0.537 (0.525)	-0.569 (0.363)	-0.444 (0.354)	-0.931 (0.583)
Inequality	-0.032 (0.077)	-0.035 (0.096)	0.520*** (0.116)	0.523*** (0.111)	0.442*** (0.136)
Inequality * 2 nd quartile	0.149** (0.072)	0.162** (0.076)	0.120 (0.074)	0.080 (0.079)	0.082 (0.099)
Inequality * 3 rd quartile	0.191** (0.090)	0.212** (0.089)	0.161** (0.079)	0.144* (0.084)	0.148 (0.109)
Inequality * 4 th quartile	0.238** (0.101)	0.302*** (0.106)	0.297*** (0.089)	0.253*** (0.092)	0.309*** (0.118)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.816	0.819	0.850	0.854	0.837
F statistic	51.15	51.87	65.28	67.40	58.94
Hausman Chi sq.	257.84***	301.21***	425.48***	512.06***	270.72***
Inequality at 1st quartile	-0.032 (0.077)	-0.035 (0.096)	0.520*** (0.116)	0.523*** (0.111)	0.442*** (0.136)
2nd quartile	0.116 (0.084)	0.127 (0.094)	0.641*** (0.100)	0.603*** (0.089)	0.524*** (0.116)
3rd quartile	0.158 (0.097)	0.177* (0.102)	0.681*** (0.101)	0.667*** (0.091)	0.590*** (0.110)
4th quartile	0.206* (0.110)	0.267** (0.117)	0.818*** (0.112)	0.776*** (0.099)	0.751*** (0.129)

Note: * (**) [***] denote significance at p<0.01 (p<0.05) [p<0.10]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).

TABLE 5
Area 2 results, non-linear interactions

	Gini 1	Rel mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Full baseline included					
EF 2 nd quartile	-0.304 (0.428)	-0.285 (0.417)	-0.212 (0.265)	-0.235 (0.261)	-0.193 (0.463)
EF 3 rd quartile	-0.619 (0.448)	-0.656 (0.431)	-0.399 (0.293)	-0.350 (0.284)	-0.751 (0.511)
EF 4 th quartile	-0.346 (0.472)	-0.301 (0.481)	-0.314 (0.359)	-0.286 (0.355)	-0.517 (0.606)
Inequality	-0.013 (0.087)	0.066 (0.109)	0.671*** (0.115)	0.652*** (0.110)	0.577*** (0.132)
Inequality * 2 nd quartile	0.002 (0.079)	-0.004 (0.088)	-0.047 (0.075)	-0.039 (0.079)	-0.037 (0.099)
Inequality * 3 rd quartile	0.112 (0.080)	0.133 (0.088)	0.072 (0.078)	0.059 (0.082)	0.125 (0.106)
Inequality * 4 th quartile	0.046 (0.078)	0.039 (0.091)	0.025 (0.083)	0.017 (0.087)	0.055 (0.121)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.809	0.811	0.847	0.852	0.836
F statistic	48.84	49.46	63.40	66.19	58.61
Hausman Chi sq.	232.11***	269.03***	396.25***	486.76***	281.39***
Inequality at 1st quartile	-0.013 (0.087)	0.066 (0.109)	0.671*** (0.115)	0.652*** (0.110)	0.577*** (0.132)
2nd quartile	-0.012 (0.093)	0.063 (0.109)	0.624*** (0.102)	0.613*** (0.091)	0.540*** (0.111)
3rd quartile	0.098 (0.089)	0.199* (0.104)	0.743*** (0.099)	0.712*** (0.088)	0.703*** (0.112)
4th quartile	0.033 (0.079)	0.106 (0.092)	0.696*** (0.104)	0.669*** (0.096)	0.632*** (0.133)

Note: * (**) [***] denote significance at p<0.01 (p<0.05) [p<0.10]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).

TABLE 6
Area 3 results, non-linear interactions

	Gini 1	Rel mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Full baseline included					
EF 2 nd quartile	-1.129** (0.458)	-1.082** (0.448)	-0.428 (0.286)	-0.304 (0.269)	-0.410 (0.483)
EF 3 rd quartile	-1.926*** (0.552)	-1.685*** (0.498)	-0.417 (0.349)	-0.264 (0.333)	-0.357 (0.579)
EF 4 th quartile	-0.778* (0.432)	-0.937** (0.470)	-0.543 (0.372)	-0.207 (0.361)	-0.474 (0.608)
Inequality	-0.124 (0.082)	-0.046 (0.093)	0.579*** (0.124)	0.616*** (0.117)	0.590*** (0.142)
Inequality * 2 nd quartile	0.262*** (0.098)	0.284*** (0.108)	0.158 (0.096)	0.087 (0.092)	0.062 (0.111)
Inequality * 3 rd quartile	0.391*** (0.111)	0.387*** (0.110)	0.107 (0.103)	0.025 (0.101)	0.017 (0.126)
Inequality * 4 th quartile	0.244*** (0.086)	0.307*** (0.103)	0.206** (0.102)	0.087 (0.099)	0.117 (0.133)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.819	0.819	0.847	0.851	0.835
F statistic	52.08	52.34	63.66	65.66	58.21
Hausman Chi sq.	324.36***	304.06***	460.15***	551.02***	321.09***
Inequality at 1st quartile	-0.124 (0.082)	-0.046 (0.093)	0.579*** (0.124)	0.616*** (0.117)	0.590*** (0.142)
2nd quartile	0.137 (0.103)	0.238* (0.122)	0.738*** (0.116)	0.703*** (0.101)	0.652*** (0.127)
3rd quartile	0.267** (0.109)	0.342*** (0.114)	0.687*** (0.097)	0.641*** (0.089)	0.607*** (0.111)
4th quartile	0.120 (0.083)	0.261** (0.115)	0.786*** (0.119)	0.703*** (0.104)	0.707*** (0.139)

Note: * (**) [***] denote significance at p<0.01 (p<0.05) [p<0.10]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).

TABLE 7
Main results, non-linear interactions, lagged inequality

	Gini 1	Rel. mean dev. 2	Atkinson 3	Theil 4	Top 10 inc. 5
Full baseline included					
EF 2 nd quartile	-0.377 (0.367)	-0.267 (0.368)	-0.230 (0.309)	-0.294 (0.299)	-0.864 (0.524)
EF 3 rd quartile	-0.537 (0.399)	-0.474 (0.401)	-0.193 (0.340)	-0.214 (0.332)	-0.575 (0.535)
EF 4 th quartile	-0.522 (0.483)	-0.507 (0.490)	-0.093 (0.421)	-0.177 (0.415)	-1.220* (0.695)
Inequality	-0.054 (0.114)	-0.159 (0.119)	-0.018 (0.141)	0.012 (0.131)	0.032 (0.149)
Inequality * 2 nd quartile	0.093 (0.089)	0.063 (0.098)	0.081 (0.108)	0.119 (0.105)	0.176 (0.122)
Inequality * 3 rd quartile	0.211** (0.092)	0.192 (0.100)	0.184* (0.109)	0.199* (0.108)	0.169 (0.126)
Inequality * 4 th quartile	0.349*** (0.107)	0.347*** (0.119)	0.344*** (0.129)	0.374*** (0.126)	0.435*** (0.159)
Period FE	Yes	Yes	Yes	Yes	Yes
Observations	300	300	300	300	300
States	50	50	50	50	50
R squared within	0.824	0.822	0.825	0.824	0.822
F statistic	53.96	53.10	52.85	53.73	53.01
Hausman Chi sq.	309.77***	367.91***	360.17***	361.46***	331.89***
Inequality at					
1st quartile	-0.054 (0.114)	-0.159 (0.119)	-0.018 (0.141)	0.012 (0.131)	0.032 (0.149)
2nd quartile	0.039 (0.084)	-0.095 (0.091)	0.063 (0.117)	0.131 (0.107)	0.209* (0.119)
3rd quartile	0.156* (0.088)	0.033 (0.092)	0.166 (0.105)	0.212** (0.092)	0.202* (0.105)
4th quartile	0.295*** (0.099)	0.188* (0.106)	0.327*** (0.126)	0.386*** (0.115)	0.468*** (0.141)

Note: * (**) [***] denote significance at $p < 0.01$ ($p < 0.05$) [$p < 0.10$]. All regressions also include a constant term; numbers in parentheses are robust standard errors. The conditional results in the lower panel are presented with conditional standard errors calculated by the delta method (Brambor et al., 2006).