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Economic growth and inequality: The role of public investment[☆]



Stephen J. Turnovsky

University of Washington, Seattle, WA 98195, United States

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ABSTRACT

The relationship between growth and inequality is complex. After discussing some general background issues, motivated by extensive empirical evidence this paper focuses on public investment as a key determinant of the relationship. Two alternative frameworks, each offering sharply contrasting perspectives, are presented. The first employs the “representative consumer theory of distribution” where agent heterogeneity originates with wealth endowments. It yields an equilibrium in which aggregate dynamics drives distributional dynamics. In the second, agent heterogeneity arises from idiosyncratic productivity shocks and generates an equilibrium in which distributional dynamics drive growth. The impact of government investment on growth and inequality are shown to contrast sharply in the two approaches, thus illustrating the complexity of the growth-inequality relationship.

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1. Background and overview

Interest in the relationship between the level of economic development, the rate of economic growth, and measures of inequality originated with the seminal paper by [Kuznets \(1955\)](#). In that paper Kuznets argued that the level of a country's development and its degree of income inequality could be described by an inverted-U relationship. The relationship was essentially a statistical one that Kuznets explained in terms of “dual economy dynamics”, associated with the structural transformation from an agricultural to an industrial economy.

Kuznets' proposition has stimulated an extensive literature analyzing the relationship between income inequality and growth and/or economic development. Much of this has taken the form of running regressions of growth rates on measures of inequality, and other control variables, with the results generally being inconclusive. For example, [Anand and Kanbur \(1993\)](#), [Alesina and Rodrik \(1994\)](#), [Persson and Tabellini \(1994\)](#), [Perotti \(1996\)](#), and others find that inequality has an adverse effect on growth. Various explanations for this have been offered, including: (i) the political economy consequences of inequality, (ii) the negative impact of inequality on education, and (iii) capital market imperfections and credit constraints.

[☆] This is a revised version of a plenary talk presented to the 2015 Conference of the Society for Computation and Economics, held in Taipei, June 2015. I gratefully acknowledge the sponsorship of the *Journal of Economic Dynamics and Control* for this presentation. My research on economic growth and income inequality has been conducted jointly with various coauthors. I am particularly grateful to Cecilia García-Peñalosa, with whom I began my work in this area some years ago. The two models that are presented in some detail here were developed with Santanu Chatterjee and Yoseph Getachew, respectively. Much of my research on this topic has been supported by the Castor Professorship and more recently by the Van Voorhis Professorship at the University of Washington and that too is gratefully acknowledged.

In contrast, other studies find a positive, or a more ambiguous, relationship; see e.g. [Li and Zou \(1998\)](#), [Forbes \(2000\)](#), and [Barro \(2000\)](#). These explanations include: (i) the relative savings propensities of rich vs. poor, (ii) investment indivisibilities, and (iii) incentives.

From a theoretical standpoint, the diversity of these empirical results is unsurprising. Both the growth rate and income distribution are endogenous outcomes of a larger economic system. Therefore, any relationship between them should reflect the underlying set of forces to which both measures are simultaneously responding. These forces are likely to change over time and vary between economies. As [Ehrlich and Kim \(2007\)](#) have suggested, “association” is a more appropriate characterization of any relationship between growth and inequality, rather than trying to attribute any direct causal link. This means that the growth-inequality relationship can be understood only as a joint equilibrium outcome of a consistently specified general equilibrium growth model.

A fundamental element crucial to the relationship between growth and inequality is the presence of heterogeneity across agents. There are many such sources, the most obvious including the rates of time preference, tastes, endowments, technology, idiosyncratic shocks, progressive tax rates, etc. Under the most general circumstances, to solve for growth and inequality simultaneously is intractable. The interaction between aggregate quantities and their distributions across many diverse individuals is too complex to enable us to advance beyond making a few general qualitative statements about the steady-state equilibrium relationship between per capita output and wealth distribution; see [Sorger \(2000\)](#). In particular, it is infeasible to characterize the dynamic evolution of wealth or income distribution as the economy develops over time. To make progress in this dimension requires some additional structure to be imposed on the system.

Thus, if we assume that the underlying utility function driving individuals' behavior is homogeneous, then for certain important sources of heterogeneity we can exploit the aggregation procedures due to [Gorman \(1953\)](#), which render the problem tractable. In this case, the macroeconomic equilibrium and distribution have a simple recursive structure. First, summing over individuals leads to a macroeconomic equilibrium in which aggregate quantities are determined independently of any distributional aspects. Having derived the aggregate quantities, their distributions across individuals are then determined by how these aggregate quantities influence factor returns. This equilibrium structure has led [Caselli and Ventura \(2000\)](#) to characterize this as a “representative consumer theory of distribution”.¹ In terms of the causality debate relating growth and inequality, this formulation assumes away any causality running from inequality to growth and can address only the reverse, as indeed was Kuznets' original focus.

In constructing any formal economic model, the choice of assumptions one makes involves a tradeoff between realism and tractability. While homogeneity is a strong assumption, in this case the tractability it yields suggests a high payoff, especially in light of the versatility of the questions it enables one to address. Moreover, the assumption of homogeneous utility is routine throughout modern growth theory, and indeed macrodynamics in general. While it includes the widely adopted constant elasticity utility function, it is much more inclusive than that.

Almost all of my research studying the growth-inequality relationship involves the recursive equilibrium structure just described. As the source of heterogeneity it has focused on the initial distribution of endowments of assets across individuals. Usually this has meant endowments of physical capital, although it has also been extended to include human capital and/or ability in considering skills, as well as foreign assets in an international environment.²

In my view, dispersion of asset endowments across agents is arguably the most important source of heterogeneity and that is the main reason why I have focused on that aspect. There is certainly much greater diversity among inherited wealth across individuals than can possibility exist between individuals' rates of time preference, which as a practical matter can deviate by only a percentage point or two across agents. Recently, particular prominence to endowments as a source of inequality has been provided by the influential work of [Piketty \(2013\)](#) and [Stiglitz \(2012\)](#).³

But, as noted, there are other sources and ways of generating heterogeneity, and these too should be discussed. One of the earliest was heterogeneous rates of time preference. This was first studied by [Becker \(1980\)](#) and shown to lead to the extreme outcome of a degenerate long-run wealth distribution, with the most patient person ultimately owning all the capital. An alternative approach assumes that people are initially identical, with heterogeneity being endogenized through uninsurable idiosyncratic random shocks; see [Krusell and Smith \(1998\)](#), [Castañeda et al. \(1998\)](#), and others. While I shall focus most of my attention on the heterogeneity stemming from endowments, in the latter part of the paper I shall briefly discuss an approach to inequality-growth dynamics which is driven by such idiosyncratic technology shocks.

In parameterizing inequality, one must decide which of the several proposed measures one wishes to consider; see [Atkinson \(1970\)](#). Of these, the Gini coefficient, which is the most prevalent, and the coefficient of variation have the most desirable characteristics, and for our purposes, the latter is particularly convenient. After selecting the appropriate inequality measure, there is the issue of which economic variable is of concern. The most widely analyzed, both theoretically and particularly empirically, is income inequality. Wealth inequality is also important, and indeed in our analysis turns out to be a key driving force generating income inequality. However, because of serious limitations with respect to data availability, empirical studies of wealth inequality are sparse. Also, if one is concerned with more general welfare measures,

¹ As a pedagogic point this means that the representative consumer model can incorporate certain important sources of heterogeneity and does not require that all agents be identical as is typically understood.

² Some of this research is summarized in the presentation I made to the NZ Association of Economists, and reported in [Turnovsky \(2013\)](#).

³ Other papers using this approach include [Chatterjee \(1994\)](#), [Maliar and Maliar \(2001\)](#), and [Sorger \(2002\)](#).

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