

GROWTH AND INEQUALITY: A REVIEW ARTICLE

Review of Aghion and Williamson, *Growth, Inequality, and Globalization*, Cambridge University Press, Cambridge, 1998, and Schmidt-Hebbel and Servén, *The Economics of Saving and Growth: Theory, Evidence, and Implications for Policy*, Cambridge University Press, Cambridge, 1999.

Rising prosperity, and a broad sharing of that prosperity, are goals in almost all societies. How can these goals be achieved? Can tax policy stimulate growth? Does growth exacerbate inequality? What explains rising income inequality in recent years? Is inequality good for growth? Two recent books: Aghion and Williamson (1998) and Schmidt-Hebbel and Servén (1999)—both recently published by Cambridge University Press offer us some important clues.¹

As background, it is worth remembering that growth in living standards is made possible when societies acquire more of the key factors of production—labor and capital. Galor (2000) has noted that countries tend to proceed through at least two stages of growth. In the first, since physical capital is scarce and since its accumulation requires saving, inequality promotes growth. In this phase of development, tax policy can be used to stimulate growth by shifting the tax burden from interest income to wage earnings. This policy makes saving more attractive. However, it accentuates inequality since interest income is concentrated among high-income individuals. As economic development proceeds, limited physical capital ceases to be the binding constraint. The increased availability of physical capital raises the return on investment in human capital. However, with imperfections in credit markets and income inequality, many individuals can find it difficult to invest in human capital. At this point in the development process, inequality limits growth and the substitution of wage taxation for interest taxation loses a significant part of its underlying rationale.

This review proceeds in four steps. First, the under-investment in human capital issue is considered in more detail. Second, alternative theories of rising inequality are explored. Third, neoclassical tax policy—that the tax burden be shifted from interest to wage income—is examined. Fourth, some empirical evidence on saving behavior is reviewed.

Aghion is among those who emphasize mechanisms through which lower inequality can stimulate growth.² He starts with the proposition that investment projects involve indivisibilities. If capital markets are imperfect, large sunk costs preclude those with limited incomes from pursuing these activities, with the result

¹ The first book contains the Raffaele Mattioli Lectures delivered by Aghion and Williamson in Milan in 1997. Significant parts of this material are available elsewhere; for Aghion, Caroli and García-Peñalosa see the *Journal of Economic Literature*, 1999, and for Williamson see *Explorations in Economic History*, 1995, and the *Journal of Economic History*, 1996. The second book contains six essays of World Bank sponsored research on saving and growth.

² Others include Bénabou (2000), Osberg (1995) and Saint-Paul and Verdier (1996).

that aggregate investment is lower. Aghion also highlights moral-hazard issues. The more an individual must borrow to undertake an investment project, the more she must share her returns with the lender. The result is a reduced incentive to supply the effort necessary to ensure a high return for the investment. In this framework, redistribution toward borrowers has a favorable incentive effect. In the “first-best” world of neoclassical economics, redistribution blunts incentives and retards growth. But in the *second-best* analyses stressed by Aghion, inequality leads governments to redistribute, and since redistribution weakens the second-best constraints, it is good for growth on this account.

Before considering tax policy and redistribution more fully, we focus on some of the competing explanations for rising inequality. The suggestion that increased trade contributes to growing inequality follows from factor-price equalization theory. Developed economies have a comparative advantage in producing skill-intensive items; the resulting increase in demand for skilled labor, and decreased demand for unskilled labor, should make incomes less equal. However, this theory also predicts that we should observe a reallocation of labor from low-skill to high-skill industries in the developed economies. What we find is that increased inequality is not accompanied by a large shift of this sort. Instead, lower-skilled workers seem to be receiving lower wages in essentially *all* industries.³ Since the skill-biased technical change hypothesis is consistent with this finding, it has become commonplace to emphasize this phenomenon, not globalization, as the key reason why income inequality has risen in recent times.

Aghion points out that this interpretation ignores the fact that many imports are intermediate products. In this case, globalization—which involves lower prices for these traded inputs—leads to increased demand for complementary factors of production, and decreased demand for substitute inputs, *throughout* the economy. Aghion argues that material inputs and unskilled labor are substitutes, so increased trade should lead to increased inequality—irrespective of an industry’s skill mix, and even in industries that produce non-traded goods. Further research is warranted in this area; without it, we cannot rule out the possibility that globalization may be having a bigger role in generating inequality than many have thought.

While making this strong plea for keeping an open mind regarding the connection between globalization and income inequality, Aghion explores the skill-biased technical change hypothesis at some length. He develops an interesting analysis of general-purpose technologies. “Network externalities” play a prominent role in this model of disembodied technical change. Since the appeal of a new technology is low until it has acquired fairly widespread use, the model predicts only minor improvements in knowledge for a lengthy period of time. Eventually, as a template is gradually created for other firms, a “snowball effect” sets in and there is an accelerating demand for skilled labor.

Aghion also examines models of embodied technical change. In this analysis, initially identical individuals become matched with machines of different vintages through time, so that more rapid technical change (a higher overall growth rate)

³This statement needs some qualification. Atkinson (1998) has stressed that recent income-inequality outcomes are not uniform across all OECD countries.

increases the variance of wage incomes. Increased expenditures on education have several effects. If that support is on pure research, it raises the productivity of only the most able workers and inequality is increased in this case. Inequality can increase *even if* the education initiatives are targeted to foster worker mobility and adaptability. On the one hand, decreasing returns implies higher earnings for the fewer individuals remaining in the less-skilled pool, so inequality can fall. On the other hand, technical change occurs more rapidly with increased flexibility, and this accentuates inequality. The prediction that, on balance, inequality can rise with the general level of education is an important one. Without this possibility, it would be a puzzle why education is not eliminating the effect of skill-biased technical change on income inequality.

Showing that competing effects exist, and that a model's prediction is ambiguous, is an important first step. Since Aghion has presented such an elegant set of analyses, augmented by a rigorous set of appendices, there should be no expectation that his part of the book should involve numerical illustrations as well. However, simplified functional forms and calibrated versions of these models would be valuable, since they could suggest how we might expect competing effects to be resolved. Thus, it is to be hoped that others will be inspired by such a clear exposition of empirically motivated theory to take up this task.⁴

Aghion also considers the trend toward matching within organizations. Kremer's (1993) O-ring theory emphasizes that the effectiveness of an entire production operation is limited by the least-efficient input. For this reason, skilled individuals have an incentive to avoid altogether working with those possessing limited skills. In the last industrial revolution, skilled workers needed the contribution of unskilled individuals. To maintain this complementary relationship, it was in everyone's interest to index the wages of the less skilled to the rise in general productivity. However, it has become increasingly the case that the O-ring mode of production has created pockets into which large groups of the unskilled become isolated. One result is a smaller incentive for others to support institutional arrangements that accomplish redistribution—with the result that inequality rises and the growth process slows. Cohen (1998) stresses this view—that the information/communications revolution facilitates acceleration of the sorting process. He concludes that globalization is not an independent cause of rising inequality. Instead, the trend toward matching is both the underlying cause of growing inequality and what has created a niche for globalization.

Aghion concludes (p. 81) that “if greater equality is to be a target of economic policy, it has to be tackled directly since market forces by themselves will, most likely, not do it.” Cohen concurs, but given the decreased incentive for redistribution that is central to his analysis, he suggests careful thought before

⁴For an example of what can be gained by pursuing the analysis in this way, consider Aghion and Howitt's (1992) model of creative destruction. That analysis has attracted widespread attention, since it is a rigorous demonstration of the theoretical possibility that a free-market economy may invest “too much” in growth-oriented research. Consider equations (4.5) and (3.4) in their paper. Define the length of each period of time so that the product of two parameters (γ and α) equals one, and assume that prices are marked-up over marginal cost by 10 percent. The implication is that, according to the calibrated model, there is no serious chance of over-investment in research. Thus, at least for the linear Cobb–Douglas example that Aghion and Howitt use for illustration, the model supports the common presumption that we are investing too little in research.

further emphasis on incentives is introduced in policy design. His analysis, and that of Ben-Ner and Putterman (1998), suggests that the more we embrace markets and incentives in the pursuit of higher productivity, the less disposed we may become to using political institutions to pursue equity.

Williamson broadens the empirical discussion by considering 125 years of history, not just the last 25. He focuses on three periods: the “*belle époque*” of increased trade during the late nineteenth century, the dark “middle ages” between 1914 and 1950 during which the globalization of the previous period was reversed, and the “renaissance” of the late twentieth century when globalization was a major fact of life once again. The first of these periods involved dramatic commodity price integration; railways and steamships lowered transport costs, and refrigeration meant that more goods could take advantage of far-away markets. Using the same care assembling data and reporting on calibrated general-equilibrium simulation models that Aghion demonstrates in analytical work, Williamson documents that globalization—more precisely, the migration of labor—was responsible for much of the growing inequality in the New World, and falling inequality in Europe, during the 1870–1914 period. Globalization “explains” more of the changes in income inequality during the first episode of economic integration than it does today because migration was a much more important dimension of the globalization experience then.

The “dark ages” witnessed a policy backlash. Williamson documents that, even before 1914, immigration policy turned restrictive in the New World and tariffs were introduced in Europe, as governments moved to defend the economic interests of those who had suffered during globalization. Williamson concludes (p. 193) that “history does supply a warning: there is an endogenous globalization backlash in our past that could reappear in our future.” He admits, however, that today’s migrations are “trivial” compared to those of a century ago, and that such important differences between the two periods of globalization make a repetition of that policy response just a possibility. Also, if there is a decreasing tolerance for redistribution, there may be less chance of another similar globalization backlash.

However, the backlash could occur through another route. Rodrik (2000) sketches several possible scenarios for the more distant future. The one that fits best with Williamson’s warning is the possibility of informal alliances among those who perceive themselves to be losers from economic integration. For example, labor advocates and environmentalists may be successful in establishing rules and regulations at the level of international agencies. Such developments would serve as substitutes for explicit redistribution within individual countries.

For the remainder of this review, the focus shifts from history and speculation concerning future institutional change to an assessment of the neoclassical approach to analyzing the relationships between tax policy, saving, investment and living standards.

If households obey the permanent-income hypothesis and supply labor inelastically, while firms hire capital up to the point that its marginal product equals its rental cost then (by assumption) the only decisions that can be affected by tax policy are those regarding investment and savings. A cut in interest taxation—financed by an increase in wage taxation—involves the government reducing its reliance on the tax that distorts, so steady-state consumption rises. For

reasonable calibrations, the elimination of 10 percent of all interest taxation raises steady-state consumption by one-quarter of one percent—an overall effect on living standards that is pretty meager.⁵ Thus, even in this neoclassical (exogenous growth) setting where all individuals are identical and wage taxation does not distort any important choice, only limited results can be expected from a major pro-savings initiative. Another under-appreciated result is that, when the market interest rate is used to calculate the present value of the entire sequence of changes in consumption that accompany this tax substitution—both the short-term reduction and the steady-state rise—that present value is zero. Thus, as Gravelle (1991) has argued, pro-savings policies of this sort have more to do with distribution across generations than is generally appreciated.

How are these insights modified in the case of small open economies? In this case, perfect capital mobility fixes factor prices, so the savings initiative does not raise either the capital/labor ratio or the wage/rental ratio. Instead, the aggregate benefit comes from domestic citizens reducing steady-state indebtedness with (or acquiring claims on) the rest of the world. This change in structure brings important differences. For the same balanced-budget reduction in interest taxation (and the same calibration), steady-state consumption of the representative agent rises by 3.2 percent—a response that is 13 times larger than what occurs in the closed economy. Although the pro-savings policy has this bigger steady-state impact, it also involves more short-term pain. The discounted present value of the entire sequence of short-term pain and long-term gain is still zero. Further, if there is a subset of the population that does not save (living just on labor income), the constancy of the wage–rental ratio means that there is no “trickle-down” to this group. Thus, whether it is the closed or open-economy version of the theory that is considered, and even before issues concerning other margins of distortion and empirical relevance are raised, the neoclassical analysis of saving yields only qualified support for conventional tax policy.

Before proceeding to empirical issues, it is worth focusing on two additional implications of the standard theory. First, in a closed-economy setting, it is the case that a decrease in the population growth rate simultaneously raises the steady-state real interest rate and lowers steady-state saving.⁶ This fact means that recent observations—involving falling savings rates in the face of rising real interest rates—cannot be taken as evidence against the neoclassical model. Both outcomes may simply follow from such things as the general decline in population growth.

⁵The specific model that generates this result (which involves Blanchard’s (1985) version of the permanent-income hypothesis) is defined in Scarth (1996, 239). With a Cobb–Douglas production function, the calibration involves capital’s share = 0.36, interest rate = 0.04, depreciation rate = 0.08, rate of time preference = 0.02525, and working life expectancy = 40.0 years (for the parameters), and capital-output ratio = 3.0, investment–output ratio = 0.24, government spending–output ratio = 0.2 (as initial conditions). The exogenous tax on interest income, and the endogenous tax on wage income, are both 0.20 initially. This closed-economy specification is compared to one for a small open economy (involving foreign debt) below. In that case, only that part of the domestically employed capital stock that is domestically owned affects the behavior of domestics. With perfect capital mobility, the foreign debt accumulation identity replaces the capital stock accumulation identity. The model is calibrated with the same set of parameter values, along with the assumption that the initial level of debt is zero.

⁶Weil’s (1989) model can be used to verify this set of outcomes.

Second, the small open-economy version of the neoclassical model can be used to explore the implications for a developing economy of changes in world interest rates. It is not generally appreciated that steady-state consumption can be reduced by a fall in world interest rates. The lower rental cost for capital increases the capital/labor ratio, so GDP rises in the developing economy. However, the lower interest rate discourages domestic saving. The resulting rise in foreign indebtedness lowers the GNP/GDP ratio, as noted by Van Der Pleog (1996). For plausible calibrations, this negative effect dominates and steady-state living standards are reduced. It appears that the neoclassical model may not support the proposition that developing countries benefit from policies in the developed world that lower real interest rates.

We conclude the exogenous-growth analysis of the last four paragraphs by emphasizing a point made earlier: even within the neoclassical framework without any second-best considerations leading to under-investment in human capital, pro-savings initiatives involve trade-offs.⁷ It is now appropriate to consider some empirical evidence on savings behavior. The book edited by Schmidt-Hebbel and Servén does just that.

The Schmidt-Hebbel and Servén book contains six essays—three by the editors and three by others: Deaton, Honohan and Obstfeld. Those by the editors summarize many important stylized facts. One is that the world saving rate has been declining for the last 30 years while the world real interest rate has been rising. As noted above, this fact—in and of itself—does not threaten the neoclassical model of household behavior. However, another finding is that (p. 8) “interest rates have little or no effect on private saving.” This finding suggests that more general specifications for the aggregate consumption function are needed.⁸ Yet another stylized fact is that per capita income appears to be positively associated with the savings ratio up to an income level of about \$17,000 (in 1987 U.S. dollars), but the association turns negative at higher levels of per capita income. Thus, the empirical evidence is awkward for analysts who believe that the marginal propensity to save rises with income—just as it is for those who stress interest rate effects.

Schmidt-Hebbel and Servén do more than summarize existing empirical studies. They present new econometric work that improves on existing literature in many ways. One result is that variations in income inequality have no consistent effect on aggregate savings. As before, however, it is not clear whether this threatens any particular class of models. For example, consider the neoclassical analyses discussed above, and assume that there is a subset of individuals who never save and who therefore depend solely on labor income. The closed-economy analysis of pro-savings tax policy then implies that steady-state savings and income inequality both rise, while the small open-economy analysis implies that aggregate savings and income inequality move in opposite directions. Perhaps, therefore, it

⁷This conclusion is complementary to that of Lansing (1999). Like the simplified models referred to in this review, Lansing’s involves an instantaneous utility function that is logarithmic and a government budget that must be balanced at all times. He finds that this set of assumptions is sufficient to overturn Judd’s (1985) surprising conclusion—that the optimal tax on interest income is zero—no matter how unequal is the distribution of income between capitalists and labor and no matter how much weight the government assigns to its redistribution.

⁸This view enjoys widespread support; for example, see Carroll (2000) and Mankiw (2000).

is no puzzle that there is no clear pattern emerging from a data set involving many countries. Finally, a noteworthy contribution of Schmidt-Hebbel and Servén is their clear elaboration of 21 major measurement problems concerning savings.

Deaton's paper is a joy to read; as with Aghion, we observe a master craftsman who writes in a clear and compelling fashion. He provides a critical survey of all the major theories of saving. One interesting result is the complicated relationship between growth and saving in the life-cycle model. As the growth rate becomes positive, aggregate saving rises; the increased saving that is done by individuals in their middle years exceeds the increased dissaving by retirees. But as the growth rate continues to rise, dissaving by the young becomes the dominant consideration and aggregate saving tends to fall. These possibilities complicate the interpretation of the correlation between growth and saving: is it saving that promotes growth or is it growth that generates more saving? Despite these uncertainties, Deaton concludes that the causation runs from saving to growth. Other conclusions are that bequest motives are more important for explaining national saving than are life-cycle retirement motives, that the aging of the population will have little effect on national savings rates, and that international differences in the arrangements for house purchase are not a major determinant of international differences in saving. To meet our desire for increased confidence on these issues, Deaton offers detailed suggestions for future research.

Honohan's paper concerns increased financial intermediation, which has mixed implications for growth. On the one hand, loans are allocated more efficiently and this should stimulate growth. On the other hand, since individuals have better access to borrowed funds, they can afford to reduce precautionary saving (and lower saving retards growth). Honohan concludes that, for developing countries in particular, the evidence confirms the existence of significant liquidity constraints, so the liberalization of financial markets may be retarding growth where it is most needed. This is an important conclusion, given IMF/World Bank policy.

Obstfeld considers foreign aid transfers in a series of models that add liquidity constraints and endogenous growth to a framework that is similar to that used to analyze a decrease in world interest rates above. The main result of this clear exposition involving calibrated general equilibrium theory is that agents in the receiving country choose to use much of the aid for consumption, not investment. This is not necessarily bad. If the purpose of aid is to raise steady-state consumption in developing countries, and if the principle of consumption smoothing is to be respected, consumption should rise with aid in the short run.

It is difficult to provide a simple recap of this review. The first section focused on whether indivisibilities in investment and liquidity constraints were pervasive enough to justify government policy to stimulate investment in human capital. If so, the government should provide tax relief for wage income, not interest income, as is the recommendation of traditional neoclassical analysis. Unfortunately, we do not know the answer to this question. The second section of the review drew attention to analyses that question one of the few tentative conclusions that the profession seems to have reached in this broad area—that skill-biased technical change, not globalization, is the principle explanation of recent increases in inequality. The third section of the review documented that the neoclassical model

of tax policy and aggregate savings gives much more limited support for “trickle down” economics than is generally appreciated. Thus, even before empirical work is considered, analysts should display humility when making recommendations based on this framework. But this analysis led to more than just this call for prudence; it allowed us to appreciate that several stylized facts (summarized in the fourth section of the review) do not threaten neoclassical analysis as much as is often assumed.

Given all this uncertainty, can *any* policies be recommended? I would answer “yes,” for three reasons. First, debt reduction permits cuts in *both* interest and wage taxation in the new steady state, so as long as it can be pursued in a way that does not hurt those who depend entirely on labor income and transfers in the short run, government debt reduction can be recommended. Second, many endogenous growth models focus on human capital investment and still provide analytical support for tax policy that favors savings. Even authors who argue that many endogenous-growth papers have over-estimated the long-run benefits of such initiatives report encouraging results.⁹ Third, while some properties of endogenous growth models are sensitive to particular specification details (such as whether human capital is produced in a market sector), one key result is not. All versions of the analysis support a progressive expenditure tax as an instrument that—when coupled with an inheritance tax—can increase both average living standards and equality.¹⁰ As a result, even with so much remaining for future research, a policymaker who is focused on *both* growth and equality can take one or two important steps with some degree of confidence.

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⁹See, for example, Hendriks (1999).

¹⁰An expenditure tax can be implemented in a straightforward manner in any economy that has a progressive personal income tax in place. By allowing unlimited deductions for documented saving, authorities can transform the income tax into an expenditure tax. The progressivity of that tax can be adjusted as an independent policy choice.

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ANNOUNCEMENT

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Measuring the New Economy Special Issue of the Review of Income and Wealth

For a multitude of reasons the measurement of GDP and, especially, real GDP has become increasingly complicated over the past decades. In particular, following numerous publications on the productivity paradox, and notably Zvi Griliches' article on this issue in *The American Economic Review* (1994), there has been a more widely shared awareness of measurement problems in macroeconomic statistics. The recent media-hype concerning the "new economy" has (rightly so or not) further fueled concerns on measurement issues among users and producers of such statistics. The problems are partly due to the greater share in GDP of sectors which have always been seen as "difficult to measure," in particular services (Sichel, 1997). In addition the measurement of output by, and inputs from ICT-producing industries has called for new methods to handle rapid quality changes in these industries. The latter introduced new problems of comparability of trends in real output across countries. Finally, measurement problems in many sectors of the economy may have risen due to the greater importance of new products and services which are difficult to measure with traditional methods that aim to separate quantities and prices. It has been widely accepted that the increased use of ICT has contributed to these measurement problems, because these technologies have helped to "customize" products and services to a great extent (Siegel, 1997; Diewert and Fox, 1997).

The Review of Income and Wealth has always been a key journal in which to address issues related to GDP measurement. Given the increased urgency to resolve these problems, a special issue of the Review to systematically address crucial aspects of GDP measurement is desirable. It will reach a clearly targeted readership interested in details of these problems.

To achieve these aims it is important to publish a collection of articles that is a careful balance among:

- papers dealing with SNA-related developments versus other empirical developments;
- papers on issues concerning ICT measurement versus other measurement issues (such as service sector output);
- papers on the U.S. versus other countries or regions.

Practical Organisation

The special issue will be edited by the regular editor of the *Review*, Edward Wolff, and a guest editor, Bart van Ark. About six articles and an introduction (by the

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All articles will be refereed by the guest editor and one outside referee; second drafts only by the guest editor, unless the regular editor and guest editor agree on the need for another outside opinion. Final decision on publication remains the responsibility of the regular editor.