## COMMENTS

## ALAN AUERBACH – AN ECONOMIST'S ECONOMIST*

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I AM DELIGHTED AND HONORED TO PARTICIPATE IN this wonderful tribute to my dear friend and long-time coauthor, Alan Auerbach. Alan and I have coauthored (occasionally with others) 23 articles and three books, and we are just getting going! I have been blessed to have a large number of fabulous coauthors, but Alan tops the list.

Alan is brilliant, deep, thoughtful, creative, patient, and always tries to do more than half the work. Whatever is the value of the economics we have produced, we have had a terrific time working together.

Alan and I met in grad school. We were both students of Marty Feldstein and were deeply influenced by Marty's research. Marty was asking, sometimes obliquely, a number of penetrating questions about how fiscal policy actually operated as a dynamic process. Alan was in the class below mine. Despite appearances, he is not younger. He took a year off before hitting graduate school.

Because we were in different classes, we did not spend a great deal of time together in grad school. But in 1979, Marty decided to hold a conference on using simulation methods to study tax issues and invited Alan and I to present papers. The conference was going to be at a spiffy resort in Florida with lots of famous economists, so Alan and I eagerly agreed. At that point, we were both at our first jobs — I at UCLA and Alan at Harvard — and we were both very scared, because we had no idea what we would write.

Somehow I conned Alan into joining forces and asked him to fly out to UCLA to spend a week figuring out what we would do. It was getting very close to the deadline for sending in our paper, and we had not a clue what to simulate.

At the end of the week, we were still at square one with no ideas and facing the humiliating prospect of telling Marty to drop us from the program. Then, the day before Alan's flight back to Boston, we started talking about what seemed to us the Holy Grail — solving the dynamic transition path of multi-period life cycle models.

Larry Summers had worked on this problem assuming myopic expectations. But pretending that people always believe that tomorrow will be the same as today did not make much sense. Nor did it connect with the rational expectations revolution that was emphasizing that people are a lot smarter in thinking about the future than economists wanted, for convenience, to assume.

The life cycle framework was then, as now, the bread and butter model of neoclassical economics. But no one knew how to calculate what that model would do if people lived for many years (periods), interacting along their lifespans with lots of other generations. As a result, no one could say how long fiscal policies took to work; which generations were hurt and helped; by how much output, factor prices, and generational welfare would change; whether one policy was really more efficient than another; how demographic change would affect the economy over time; how policies announced in the future would affect things today; and how asset prices would evolve through time in reaction to policy changes.

The model we were trying to solve was roughly a 160th order nonlinear difference equation. Mathematicians have no methods for solving such a model without using linear approximations — approximations that are not appropriate for considering large policy changes.

Alan and I were familiar with numerically simulating the steady state of a life cycle model by using Guass-Seidel iteration. So it dawned on us that such iteration might work in solving for the economy's dynamic transition path. Our idea was to a) guess the economy's capital-labor ratio and associated factor prices over its transition path, assuming the ratio reached its steady state value after a healthy number of years, and b) guess fiscal parameters and then feed this information to the household sector to get back its annual relative supply of capital to labor and use this, as well as updated tax parameters, based on the government's budget constraint, to form new guesses for the next iteration.

We then spent the next 24 hours programming in Fortran a very stripped down model, but did not have time to see if it worked before Alan had to fly back to Boston. Over the next couple of days, we worked over the phone to kill bugs, and I kept watching the huge printer in my apartment as it spurted out results. I told Alan that the capital-labor ratio path iterations seemed like a snake that was twisting around, and the question was whether it would flatten out on top of its prior location.

Finally, all the bugs were killed and the huge printout showed the capital-labor ratio path had converged. I was ecstatic and immediately called Alan. He was not home, but I told Gary to convey these four words, "The snake has flattened."

It was not quite inventing the telephone, so playing Alexander Graham Bell was certainly far over the top, but Alan and I both knew there were a vast number of first-order questions we could now answer with this machinery. Also, we knew we would get to go to Florida.

Over the next few weeks we worked furiously to make the model more realistic and use it to start asking some key questions, like how moving from income taxation to either consumption, wage, or capital income taxation would affect the economy and different generations, and how long it would take for the effects to arise.

In Florida, we had Joe Stiglitz as our discussant and were overjoyed when he called our paper a "tour de force." This was all the encouragement we needed, and Alan and I spent the next several years exploring whatever more elaborate versions this model wanted to tell us.

One paper, with Jonathan Skinner, my RA and grad student who took over the programming, showed how to use what we called the Lump Sum Redistribution Authority to determine if one tax structure was more efficient than another. We did this by solving, in general equilibrium, for a Pareto path in which no current generation was hurt and all future generations were helped.

We learned a lot of lessons about generational policy. In particular, we learned how much damage policies, such as those the developed world has been running for the last six decades, can do to national saving, domestic investment, the growth of real wages, and the wellbeing of young and future generations.

We also learned that policies that have extremely bad long-run effects can have extremely good short-run effects, that income effects are much more important than incentive effects when it comes to the impact of tax reforms, and that a wide variety of different sounding policies produced very similar results.

Of particular interest in this regard was government policies that redistributed across generations in a very subtle way, namely by changing the market value of assets. Since wealth in the life cycle model and the real world is primarily held by the old engineering via fiscal policy, a drop in asset prices hurts the old but helps the young who get to purchase those assets at a lower price.

Marty Feldstein's marvelous paper on taxing land rents helped all his students see the connection between policy, asset prices, and generational distribution. And Alan, prior to our collaboration, wrote his now classic papers on dividend and capital gains taxation that showed how changing the relative size of these tax rates would affect the value of retained earnings and visit capital gains or losses on the elderly.

As Alan and I were doing our research, supply side economics was all the rage in some parts of the policy world. And since we had the best tool going to study supply side policy, we did our level best to see if cutting taxes could produce more revenue over the long-term. The answer was no, at least for the empirically reasonable way we calibrated the model.

There was, however, one exception we discovered, namely providing enhanced investment incentives, such as going to full expensing. This policy, which produced less revenue initially, served, in our model, to produce more revenue over time with no requisite future hike in tax rates. Franco Modligiliani discussed this paper at a conference. At first he thought it could not be right, but after we explained the source of the result, he described it as 'pulling a rabbit out of a hat."

The source was not incentive effects, as supply siders imagined (Indeed, Art Laffer wrote me a note calling our paper "sublime"). The source was effectively a tax hike coming in the form of a reduction in the market value of the elderly's holdings of existing capital. Existing capital does not receive write-off privileges when one increases investment incentives, so its sale price drops in the market because purchasers of old capital realize it does not come with a tax break.

Laffer thought we were cutting taxes, when we were actually raising them on the old by having Uncle Sam engineer a wealth tax dressed up as a

decline in the stock market. Since the old are the big spenders in the life cycle model reflecting their rush to party in the short time left before departing mother earth, zapping the wealth of the old lowers their consumption, raises national saving, raises domestic investment, and produces a larger tax base and more long-run revenue.

What Laffer thought sublime, he would have found deeply troubling to his napkin economics had we described the policy as involving primarily a major tax hike on the elderly.

In this and other simulation studies, Alan and I began to see that the same general results were showing up from what seemed, on face value, to be wholly different policies. This started raising questions in our minds as to whether the policies were actually different or whether we were simply labeling the same policy with different words.

In our 1987 book, *Dynamic Fiscal Policy*, Alan and I devoted a chapter to deficit delusion, a term I coined in a 1984 article in the *Public Interest*. This chapter showed that any given policy can be relabeled in arbitrary ways. In particular, policies that massively take from the young and give to the old can be run under the guise of near or complete budget balance, with Social Security and Medicare being prime examples.

This, of course, is what our government has done for decades. It has chosen fiscal labels to ensure that virtually all of its true liabilities have remained off the books. In so doing, it has provided a terrible example of cooking the books to corporate pension plans, state and local governments, and companies like Enron, not to mention Wall Street.

Our concern with the government's ongoing pattern of concealing its policy of fiscal child abuse under the guise of budget balance lead Alan and me, together with my then grad student Jagadeesh Gokhale, to produce a set of generational accounts for the U.S., as well as an analysis of what would be needed to eliminate the economy's infinite horizon fiscal gap.

We took on this major task at the arm twisting of David Bradford, who we both cherished as a friend, mentor, and supporter. Were David still with us, he would be right here with me singing Alan's praises.

I am happy to say that the life cycle simulation modeling and new metrics of generational policy and sustainability have spread across the world. Countries aa far afield as Argentina and Tailand have done generational accounting. Norway has established a generational fund in recognition of the generational inequities revealed by Norwegian generational and fiscal gap accounting. And the list goes on.

Our life cycle simulation model has also become a standard tool used by economists around the world. Today's versions of the original Auerbach-Kotlikoff model feature multiple countries producing multiple goods with multiple types of workers. Thanks to the work of Sabine Jokisch, Hans Fehr, Kent Smetters, Shinichi Nishiyama, the new models also include idiosyncratic wage and lifespan uncertainty. And work by Dirk Kreuger, Felix Kluber, and other have begun to incorporate aggregate economic shocks.

The lesson of this research is that these models have a lot to teach us. But we must bear in mind that they are far too stylized to draw firm policy conclusions.

In addition to the work I have mentioned, Alan and I took time to work on life insurance adequacy, U.S. saving and demographics, and the extent of annuitization. We also wrote and rewrote an undergraduate macro textbook that has a lot going for it, apart from sales.

While I have focused on our joint work, Alan has an enormous body of terrific research on his own and with many other coauthors on fiscal sustainability, budget policy, pension design, tax reform, dynamic scoring, tax incidence, optimal taxation, investment incentives, law and economics, and the list goes on.

Finally, Alan has made an enormous contribution to the profession in helping to lead the Department of Economics, first at the University of Pennsylvania and then at Berkeley, in editing or serving as an associate editor of leading journals, in serving as vice president as well as a member of the Executive Committee of the American Economic Association, and in testifying to, consulting for, and serving with different bodies of our government.

To conclude, Alan Auerbach is an economist's economist. They do not come better and the National Tax Association could not find a better recipient of the Dan Holland Medal.