The Less-Known Paul Krugman*

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It is a special pleasure for me to be speaking at this lunch honoring Paul Krugman for his Nobel Prize. I have known Paul for over 30 years, starting with another lunch – in a pub near Warwick where we discussed the then brand-new models of monopolistic competition in trade. I never had the pleasure of teaching him or supervising his research, so I cannot enjoy the parental pride of one whose academic child has made good, but perhaps I can be an academic sibling whose kid brother has made good.

Speaking about Paul more than a year after his prize presents a challenge. So much has been written and said about Paul's pathbreaking contributions to new trade theory, strategic trade policy, and economic geography, that any lengthy recapitulation would be boring. Therefore I will instead speak of some of his other contributions to international economics.

I begin with international macroeconomics. Paul's interest in this area is not surprising in view of the fact that Rudi Dornbusch was his supervisor. Actually Rudi's influence on Paul is even more important: it was Rudi who first recognized the promise of Paul's work on monopolistic competition and encouraged him to pursue it.

Balance-of-payments crises

Paul's work on this topic began very early in his career; his first publication on it was almost simultaneous with his monopolistic competition work. Suppose a government is trying to maintain an overvalued exchange rate in spite of some fundamental imbalance. The government's foreign currency reserves will run out eventually, and it will have to abandon the peg. In the absence of forward-looking speculation, the price level would have to jump at that point so as to maintain equilibrium in the money market. But forward-looking speculators will act in anticipation of any price discontinuity, to make large capital gains (or avoid large capital losses). These actions will eliminate the discontinuity. In the present context, this means getting out of the domestic currency, that is, a speculative attack that speeds up the loss of the government's reserves. To model this properly, the dynamics of the original fixed rate and the eventual floating rate regimes must be stitched together in such a way as to maintain price continuity. This determines the time when the speculative attack suddenly wipes out the government's reserves, earlier than the time when they would have run out in the absence of speculation.

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This model not only gave a good account of a phenomenon often observed in reality, but was a beautiful analytical exercise in applying macroeconomic models of saddle-point dynamics that were pioneered by the work of Hall, Dornbusch and others. It deservedly inspired much later research.

Exchange rate target zones

This work is another beautiful piece of analysis. Suppose the exchange rate of a country or a currency union is fluctuating in response to shocks that move some fundamental determinant of it. The government or a central bank maintains the exchange rate within a band, buying or selling reserves as appropriate when the rate hits the upper or lower limit of the band. As the rate approaches the band, forward-looking speculators will rationally recognize that their prospects for capital gains or losses are limited. This will affect their actions, and therefore will alter the relation between the exchange rate and the fundamental. Near the ceiling, for example, speculators will recognize that the rate is more likely to fall; they will reduce their holdings and stop the rate from rising as fast as it otherwise would. In other words, speculation works to stabilize the rate within the band.

This model requires techniques of stochastic dynamics and option pricing, and brings me to a general point. Paul once said: "I'm not much of a mathematician." If by mathematician we mean someone who constructs new mathematical structures, he is not one at all, any more than most or all economists are. But he has a really good intuitive understanding of the mathematics, and uses it with ease and elegance. In this instance, the relation between the exchange rate and the fundamental at the end-points of the target zone or band has to be found using a higher-order contact or "smooth pasting" condition. Paul used it, without any rigorous proof of why it applied in that context. It took us a while to figure out what happens to a Wiener process at a reflecting barrier; Paul knew it instinctively.

Another instance of this came in his work on strategic trade policy in multiple markets with increasing returns. He showed that the advantage given to a firm in one market, by lowering its marginal cost, extends the advantage to all markets in a cumulative fashion. As I said in my article in the Journal of Economic Perspectives on the occasion of his Clark Medal, "In almost anyone else's hands, this model would have got bogged down in a mathematical morass of matrix inverses and fixed points. It needed Krugman's deeper understanding of the problem to cut it down to its essentials and express the argument in simple diagrams."

Competitiveness

Of Paul's numerous contributions and interventions in public policy debates, the one I regard as most important is also the one where he seems to have had the least influence: his crusade to explode the myth of "national competitiveness". In a major article in Foreign Affairs, and in many other forums, he has tried to explain

that "a country is not a company". If a company is so unproductive that it cannot pay the going market wages to its workers (and pay for its other inputs), it cannot survive in the economic marketplace. (Of course many such companies survive and even thrive in the political marketplace, but that is a separate issue.) If a country is similarly unproductive, the demand for its labor (and for other inputs that are trapped within its borders) falls; therefore its wage rate falls, reducing its cost disadvantage.[1] Roughly speaking, the country's wage rate reflects the average of its labor productivity over all goods and services. Its productivity relative to the rest of the world differs across these goods and services. After the wage rate has adjusted, it will retain cost competitiveness in world markets in those goods and services where its wage advantage exceeds its productivity disadvantage. Conversely, a country with high labor productivity will have a high wage rate, and it will have a cost advantage in world markets in those sectors where its productivity advantage outweighs its wage disadvantage. In fact this is just what economists mean by comparative advantage in the Ricardian model. In other models the argument needs a little refinement, but basically the same idea carries through.

It is hard to believe, but true, that this simple truth has such difficulty penetrating the brains of many supposedly intelligent non-economists. Paul's crusade will have succeeded when the World Economic Forum, and other similar gatherings of the great and good, stop producing their competitiveness rankings of countries. But I am not holding my breath, and you shouldn't, either.

Paul Samuelson once said about comparative advantage that if students who had taken his course on the subject understood and remembered the concept for about a week beyond the final exam, that was as much as could be hoped for. This may be a challenge even beyond Paul's formidable expository skills.

Interstellar trade

The trait I most admire in Paul is his ability to think ahead and spot an oncoming economic problem long before others are aware of it. He demonstrated this very early in his career; in fact he looked so far ahead that the issue has not yet caught the attention of policymakers. He recognized that space travel will lead to trade beyond the confines of the earth, and wrote a paper titled "Interstellar Trade" discussing some implications of this. This was written in the late 1970s, and has long been one of my favorite papers. But is still unpublished; many of you may not know it. I don't know how many journals turned it down; perhaps Paul can give us a list.

The aspect of interstellar trade that Paul focused on is the fact that transport will take a long time; therefore interest on the capital tied up in goods in transit will be an important part of the cost at destination. But should the interest be calculated

[1] In the jargon of economics, the wage rate is an exogenous variable for a company, but an endogenous variable for a country.

using time in the frame of the origin planet, the destination planet, or of the rocket carrying the goods? If interstellar trade is to be practical, transport will have to occur at speeds close to that of light. Then there will be relativistic effects: time in transit will appear less to an observer traveling with the goods than to one on either planet. Paul uses an arbitrage argument to prove the First Fundamental Theorem of interstellar trade: the correct rate is the one in the inertial frame of the planets, not in the frame of the carrier rocket. When bonds can also be traded, we get the Second Fundamental Theorem: asset trade will equalize the interest rates on two planets in the same inertial frame. These theorems constitute his "stellar – not lunatic – vision" of galactic trade.

There are incidental delightful bits in the paper. The acknowledgement footnote gives thanks for financial support to the Committee to Re-Elect William Proxmire.[2] A passing remark delivers a devastating verdict: "This paper is a serious analysis of a ridiculous subject, which is of course the opposite of what is usual in economics." And the concluding paragraph of "Interstellar Trade" is worth quoting in full:

"Is space the Final Frontier of economics? Certainly this is only a first probe of the subject, but the possibilities are surely limitless. (In curved space-time, of course, this does not prevent the possibilities from being finite.) I have not even touched on the fascinating possibilities of interstellar finance, where spot and forward exchange markets will have to be supplemented by conditional present markets.[3] Those of us working in this field are still a small band, but we know that the Force is with us."

Paul may still be the only Jedi in the galactic field, but the Force has definitely been with him for all of these thirty years.

[2] Explanation for youngsters who have never heard of William Proxmire: the late senator from Wisconsin said many absurd things about trade and economics that became valuable as classroom jokes and quotations to be rebutted in exam questions. This made it imperative for the profession that he be re-elected.

[3] And, I might add, opens up interesting possibilities for financial innovations and frauds as well.