

JHET INTERVIEWS: ANTHONY WATERMAN
BY ROSS B. EMMETT

Anthony Michael Charles Waterman is currently Retired Fellow, St. John's College, Winnipeg; Emeritus Professor of Economics, University of Manitoba; and Senior Member of Robinson College, Cambridge. He was Teaching Fellow in Economics and Political Science (1959-1962), then Assistant Professor of Economics, St. John's College (1962 to 1964); Associate Professor of Economics, St. John's College and the University of Manitoba (1967-1972); and Professor of Economics, University of Manitoba (1972-2006). He was also a Lecturer in Theology, St. John's College, Winnipeg (1975-1976, 1988, and 2003-2006), and Director of the Institute for the Humanities, University of Manitoba (1992-1995, 1998-2000). He was a Research Scholar in Economics at the Institute of Advanced Studies, Australian National University (1964-1967), and Tutor in Theology at St. Mark's Collegiate Library, Canberra (1965). His book *Revolution, Economics and Religion: Christian Political Economy, 1798-1833* (1991a) was awarded the Morris D. Forkosch Prize for Best Book in Intellectual History, by the *Journal of the History of Ideas* (1992). In 2007 he was made a Distinguished Fellow of the History of Economics Society; and in 2014, an Honorary Member of the European Society for the History of Economic Thought. The following interview was conducted via email during August and September 2020.

Emmett: *What led you to study economics when you went up to Cambridge?*

Waterman: My incompetence in the laboratory.

I went up in 1951 to read for the Natural Sciences Tripos, and specialised in chemistry, botany and zoology because I wanted to do research in molecular biology, which was very much in the air at that time. It was during my years as an undergraduate that Watson and Crick, working a few yards away from our Science Faculty lecture rooms and laboratories, discovered the double helix. But since all science undergraduates had to spend 6 hours a week in the laboratory for each of their courses I had 18 hours a week, which meant every afternoon, Monday to Saturday -- when most of my fellow-students were playing various sports, punting with young ladies on the river, or simply relaxing. I shouldn't have minded in the least had I liked or done well in the lab. But I was hopeless: 15% of the theoretical yield in organic chemical preps; unusable plant sections for the microscope; bungled dissections of frogs, rats and cockroaches. We were supervised by demonstrators, mainly female graduate students, who made little effort to hide their contempt for my ineptitude.

Towards the end of my first term I was complaining about this to a friend I had known in the army. 'Why don't you do what I did?' he asked: 'Switch to economics. You get all the pleasure of scientific thinking without the pains of laboratory work.' Since I had come to realise that becoming the kind of scientist that I had hoped to be would mean spending the rest of my life in the lab -- and that I should never become expert -- I followed his advice. I switched to Part I of the Economics Tripos in January 1952 and have never regretted it.

Emmett: *You had the opportunity to spend a year with Joan Robinson as your supervisor. Can you describe her as a supervisor?*

Waterman: I have written about this in detail elsewhere (Waterman 2003a).

With one exception, Joan Robertson was the most intelligent person I have ever met. She instantly grasped the implications of a set of assumptions, followed them through to a degree of complexity far beyond the grasp of any ordinary mind, saw at once the weakness in any line of argument: and was incapable of understanding why the rest of us were unable to follow. But I was a lazy and incompetent student, and my weekly essays were pretty feeble. She patiently tried to help me, but I had never really grasped what economics is all about.

The most valuable lesson she or anyone else taught me at Cambridge, was to grow up. It is thanks to Joan Robinson alone that I went down at the end of that year intellectually and morally equipped to begin life as an adult.

Emmett: *Who else did you meet among the economists while at Cambridge?*

Waterman: In my first year I had been supervised by my Director of Studies, Alexander (Sandy) Youngson Brown, a kindly and hospitable Scotch economic historian and expert on the American economy; and in my second year by A. D. Roy, a theoretical statistician. In all three years my fellow-student was John Chown – a man among boys in our college -- who got a starred First in Part II and won the Adam Smith prize. He was already talking about linear programming and game theory, and could have become a distinguished theoretical economist. But instead he chose to go into business, become a very rich man, a munificent patron of the Arts, and an Honorary Fellow of our college [RBE – see Chown (1994, 2003)].

Chown and I got to know Peter Bauer, whom I met up with again 30 years later when he visited Canada. Though I went to very few lectures I do remember one or two by Nicholas Kaldor, in particular one on the capital theory of Hayek (of whom he had been a student.) And I did attend all the lectures on the American economy by Professor Corwin D. Edwards, who spent a year at Cambridge in 1953-54 before going on to Chicago. Harry Johnson was then a Fellow of Kings and writing his path-breaking articles on international economics, which he delivered as lectures. I got to know him in my last months in Cambridge when I was about to move to Canada; and fifteen years later, when I had become an academic economist in Winnipeg, we became better acquainted. Harry made it his business to know every Canadian economist personally.

But the big name in my final year was Milton Friedman, Fulbright Fellow at Gonville and Caius College. I shall never forget the excitement and sense of occasion at his Marshall Lecture in a large hall, standing room only; Joan Robinson and Nicky Kaldor in the front row loudly barracking him in the question period, Milton smiling and imperturbable, politely giving as good as he got. When I got to know him in the 1980s he spoke very appreciatively of Joan, in particular of her willingness to recognise him as a fellow-scientist and ally in the pursuit of truth.

Emmett: *At some point you went to Eastern Europe shortly after the end of WWII and before travel there became too difficult. What did you learn and did it have any impact on your future decisions?*

Waterman: Travel had already become difficult in 1949, but I got visas for Hungary and Czechoslovakia because I went with a ‘delegation’ of young communists to the second World Peace Festival organised in Budapest by the World Federation of Democratic Youth. Before joining the British delegation I warned them that I was quite literally a card-carrying member of the Young Conservatives, but my new friends were undeterred. ‘That doesn’t matter in the least, Comrade! If you’re sincerely committed to world peace, we should love to have you’. So I joined the ‘delegation’ and travelled with them to Budapest in very slow trains on wooden seats and with no food.

After the Festival I went to Bratislava in what was still ‘Czechoslovakia’. An Old Boy of my school was then British Council representative in that city, where he lectured in English at the local university. He had arranged that I stay with the (‘bourgeois’) family of one of his students as a guest. After a week or so I went on to Brno, capital of Moravia, where I was a guest of the local British Council representative and his wife. And then on to Praha where I stayed another week and saw four operas in the *Národní divadlo*. Then back to England for my last term at school before joining the army.

I learned a lot about the abominable tyranny of life under communism. Constant fear of sudden arrest and disappearance; deliberate persecution of ‘bourgeois’ families and individuals; inexplicable shortages of some consumer goods; luxury items -- when available -- reserved for Party officials; inability to trust one’s neighbours, any of whom might betray one to the Party; frequent, well-organised ‘spontaneous demonstrations’ – thousands of Party members and their hangers-on marching in step through torch-lit streets carrying vast banners with images of Lenin, Stalin and the local Dictator, chanting slogans in a ritual modelled on the Nazi Nuremberg rallies of the 1930s.

It was an instructive experience for an 18-year old schoolboy. Though I had never found socialism an attractive idea, certainly not under the post-war Labour government in Britain, that experience pushed me in a libertarian or at any rate a liberal direction for the next thirty years.

Emmett: *What led you to move to Canada?*

Waterman: During the Long Vacation of 1953 I visited Canada, staying as a guest in Sarnia ON with my distant Canadian cousins. I got a labouring job in one of the petrochemical plants and made enough money to pay all my travel expenses to and from England. I fell in love with Canada during that visit and also with my fourth cousin, who was spending the summer in her parents’ picturesque cottage on the shore of Lake Huron. I decided it would be a waste of time to go back to Cambridge. I would go up to Red Lake, become a diamond driller, save \$10,000, return to Sarnia, start a business, and marry my cousin. Her mother implored me to return for my final year. ‘Your mother would never forgive me if you didn’t.’ What could I say? Very unwillingly I went back for my final year, vowing to return the following summer, which I did.

So I have my mother-in-law to thank for that crucially important year with Joan Robinson.

Emmett: *What was your experience in working in Canadian industry?*

Waterman: I married, and lived in Sarnia for a couple of years working for a firm of Chartered Accountants in order to master the rudiments of accountancy. Then I got a much more highly paid job as an economic analyst in Montreal, in the head office of *Canadian Industries Limited* (C-I-L).

This innocently named firm is an instructive case. During the great depression of the 1930s the world chemical industry was cartelised. DuPont was to have the Americas, ICI the British Empire, and IG Farben the rest of the world. But Canada is both 'Americas' and 'British Empire.' So DuPont and ICI set up a jointly owned subsidiary to monopolise the Canadian chemical industry. It flourished during the World War II making explosives, ammunition and other war goods; and after the war its many operating divisions produced, in addition, heavy chemicals, paint, plastics, synthetic fibres, fertilizers and other things. I was hired by the Chemicals Division which made heavy chemicals (caustic soda, chlorine, sulphuric acid etc.) for the paper and manufacturing industries, and was placed in its Control Department.

The three-and-a-half years I spent with C-I-L were among the most fruitful and instructive of my life. I usually worked in a small group of six or seven others, all of whom were Honours Economics graduates. And though I have worked in universities and colleges in Canada, Australia, Britain and the USA, I have never enjoyed better conversation than with my colleagues in Chemicals Control.

My regular task when I began was to prepare the first draft of the General Manager's quarterly 'Profit Forecast'; and then to write the first draft of his 'Quarterly Report' to the President explaining why he had failed to make the profits I forecasted. I was also asked to do many smaller jobs: to explain why our price index gave perverse results; to advise the Sales Manager on a pricing policy to defeat competition from small dealers in Toronto; to advise the Accounting Manager on suitable rates of depreciation of fixed assets in the general ledger. But because at the heart of all our work was the estimation of rates of return-on-investment – no small problem in a multi-product firm -- I was drawn inevitably into research. What is the value of the capital employed in every process? Two or three of my colleagues and I puzzled over this, with help from the *Harvard Business Review* which was interested in that subject just then. Dated time was of the essence of the problem, because some of our plant and equipment – such as our synthetic ammonia plant in Cornwall ON – took years to bring on stream, and was expected to produce for many more years. Therefore the time-shape of (discounted) cost and income streams was crucial. And so in 1957 my colleagues and I inadvertently discovered the capital-theoretic phenomenon of 're-switching', utterly unaware that Samuelson, Joan Robinson and other academic economists at the two Cambridges were debating the same issue at exactly the same time.

Intellectually stimulating as all this was, it was my encounter with computers that was of the greatest value in my subsequent career. Sir Robert Watson-Watt, who claimed to have invented the electronic computer, was to give a 'seminar' in Montreal. The large corporations sent their bright young men to smell it out. We all reported to our employers that we could see no useful function in business for the computer. But about six weeks later a memo went round our company: we had acquired an IBM xyz computer; it was in room abc together with a tame programmer; anyone with ideas about what to do with it should go and talk with the programmer. Why was our advice flouted? Because the head offices of all the great corporations were then in Montreal; the CEOs met for lunch at the Engineers' Club; Alcan would say to CPR 'when are you guys getting a computer? Ours came last week'; and the spirit of emulation impelled each corporation to acquire this useless and expensive equipment.

At that time I was about to leave C-I-L to do something quite different. So I spent my last two months with the company in the computer room, much to the relief of the programmer who was isolated, ignored, lonely and without anything to do. He explained everything to me, taught me FORTRAN, and helped me programme some of my quantitative research problems. That experience was of lasting benefit to me. My Bachelor of Theology thesis included a problem in temporally variable rank correlation for which I was able to devise a programme. And my doctoral research in Australia required much time-series analysis for which I had the services of a professional programmer.

Emmett: *Can you tell us about your decision to leave industry and enter the priesthood?*

Waterman: I was a fairly recent convert to Christianity, and like some other male neophytes at that time found it attractive to imagine that I had a vocation to the priesthood. The Bishop of Montreal was willing to ordain me after study at Bishop's University. Our son was nearly two; the three of us would occupy a vacant rectory in the Eastern Townships. Some kind of financial support would be forthcoming.

Emmett: *Did you have any inkling you would be returning to doing economics?*

Waterman: Not when these arrangements were proposed.

But a few weeks later I got a letter addressed to me at my office in C-I-L from a man I had never heard of, describing himself as the 'Dean' of a college I had never heard of, saying that he understood I was an economist, that I wished to study theology with a view to ordination, that I had a wife and child to support -- and would I consider coming to his college and lecturing in economics whilst preparing to be ordained? The Bishop of Montreal had no objection, and my wife thought it sounded better than the Eastern Townships, so I said 'yes': and moved to St John's College Winnipeg to become Teaching Fellow in Economics and a First-Year Theology student.

Apart from the move to Canada in 1954, this was the most momentous decision of my entire life.

Emmett: *Can you tell us about your decision to go to enter graduate study in economics?*

Waterman: It wasn't my decision.

It was that of my bishop: Archbishop Howard Clark, Metropolitan of Rupert's Land and Primate of Canada, who had taken me over from Montreal. I had done well in theology, and the College wanted to send me to General Theological Seminary in New York to take a doctorate and become an academic theologian. But Archbishop Clark vetoed it. According to those who were at the meeting, he said 'We have too many theologians in the Church and not enough economists. Waterman is an economist. I want him to take a doctorate in economics'. He ordered me Deacon, then Priest, serving an unpaid curacy in Winnipeg – whilst lecturing in economics full-time at the College and in the University of Manitoba (of which St John's is the oldest part).

After two years the Archbishop released me, as agreed, to take a doctorate at 'any respectable university'.

Emmett: *Where did you go?*

Waterman: I had intended to go to Chicago. But our Australian Dean who had recruited me was once again crucial. He was a scholar of Commonwealth Literature, and a friend of his, the Professor of Poetry at the Australian National University, was paying the College a visit. The Dean introduced me at the cocktail party and mentioned that I was about to work on a doctorate in Economics. When our visitor heard where I intended to go he derided 'Chicaggo' and asked why I wasn't going to the 'I-N-you' (ANU). He told me all about it in his hotel room next morning and urged me to write to his friend Noel Butlin, Head of Economic History (because Trevor Swan, Head of Economics, never answered letters).

As in Canada, education is a State (= Provincial) responsibility in Australia. But unlike Canada the national capital, Canberra, sits on its own capital territory. Therefore its government can run schools and universities as it pleases. In 1945 the government decided to establish the Australian National University (ANU): a lavishly funded, all-research, all graduate university to reverse the brain-drain from Australia, then chiefly to Britain. An important part of this programme was the system of Research Scholarships for doctoral students from abroad, who might be induced to remain in Australia after graduation.

When Butlin answered my letter (in which I did happen to mention Joan Robinson) he told me to send my Bachelor of Theology thesis by airmail immediately, to get my Department Manager at C-I-L to describe my research for the company, and to get a letter of support from Clarence Barber, the internationally known Head of Economics in the University of Manitoba. I complied; and shortly before Christmas got a letter saying I had been elected to a Research Scholarship for three years in the Institute for Advanced Studies, beginning August 1964.

That scholarship took me, my wife and our (by now three) children to Canberra, and back again to Canada in 1967; provided us with a furnished, three-bedroom flat in a charming, landscaped university compound; paid all my fees and research expenses including travel in Australia; paid me a stipend based on marital status and number of children, on which we were able to buy a car, take an annual holiday, and drink tolerable Australian wine every day. It even

paid for the typing of my thesis. And because I could not remain in Australia for my oral examination, they appointed Arthur Smithies at Harvard as my chief examiner, and paid my travel expenses from Winnipeg to Cambridge MA and back.

Emmett: *What did you study?*

Waterman: Fluctuations in the Australian growth-rate since 1945.

When I arrived I was given a comfortable office, first-rate secretarial help, a computer programmer – and three years to spend in any way I chose. There was no ‘course work’ of any kind. There were no undergraduates to teach. My only departmental obligations were two weekly seminars: one for work-in-process where we presented drafts of our articles and thesis chapters, the other for staff members to try out their stuff. And I had two supervisors: Trevor Swan and Noel Butlin (I was actually in two departments, Economics and Economic History.) So what was I going to do?

In Manitoba I had become interested in Clarence Barber’s work on macroeconomic policy in a small open economy. Swan was the leading authority in Australia on this and highly-valued advisor to the government – and also, with Robert Solow, a pioneer in economic growth theory. He and Butlin agreed that I should work on the Australian economy.

Emmett: *You returned to Winnipeg, taught economics, and served as a priest? How did you balance your responsibilities?*

Waterman: I did indeed return to Winnipeg, though not altogether willingly. The ANU wanted to keep me in Australia, and Swan offered me a ‘Professorial Fellowship’: i.e. professorial rank and salary, immediate tenure, and no duties for life. Every academic’s dream job! I wrote to Archbishop Clark asking for Letters Dimissory, enabling me to transfer to the Diocese of Canberra and Goulburn, where I had worked hard during my three years at the ANU and where I was *persona grata*. But he replied saying that he wanted me back in Winnipeg.

St John’s was glad to have me back, and Barber made me an Associate Professor with tenure in the Economics Department, of which I myself became Professor and Head a few years later.

The Archbishop had moved to Toronto, but his Suffragan posted me as Honorary Assistant Priest to various Winnipeg parishes where I could be of use on Sundays. And as one of four or five other priests in the College I took my share in the daily chapel duties. I was asked by the Diocese to give lectures and courses in theology, and was elected to General Synod of the Anglican Church of Canada. But by the late 1970s I came to see that I had mistaken my vocation; I resigned the exercise of my Orders and have been canonically a layman since 1980.

Teaching economics was no problem; but my research – still on open-economy macroeconomics at that time – was more demanding. However my wife looked after me and the children (by now four), and made sure that I had proper recreation and leisure.

Emmett: *What led you to start work on the history of economics?*

Waterman: That's a long story: and here too Archbishop Clark was crucial.

He wanted me to become an economist because he saw that the Church should stop talking nonsense about public policy. He envisaged me as the in-house expert on the relation between theological principle and economic realities in Christian public policy.

For a decade I was so taken up with economics, administrative duties and other concerns that I neglected this task – except only in some work I did for General Synod in the 1970s on poverty in Canada. But I knew I should have to get to grips at a theoretical level with Christian social doctrine. The opportunity came in 1979, when I was elected to the Reckitt Fellowship in Christian Social Thought at the University of Sussex. The question was, how and where should I start my inquiry?

Whilst a Visiting Fellow at Oxford in 1971-72, I had read Malthus's first *Essay* and discovered that the last two chapters contained a theodicy of the 'natural evil' of overpopulation, omitted from all subsequent recensions. Malthus was an Anglican cleric and an economist – the first-ever economist, I am now inclined to think. So this seemed to be a good place to start a study of the relation between Christian theology and economic theory.

When I arrived in Sussex therefore, I began by analysing the theology of the last two chapters of ([Malthus] 1798). The following Spring I presented my findings at the *Congrès Malthus* in Paris (Waterman 1983, 1985). And at Sussex I met and became friends with the late Donald Winch, whom I have always regarded as one of my two masters in the history of economic thought. The other is Samuel Hollander. Since the 1980s each has had a lot to say about Malthus, from which I have learned much.

But once I got started on Malthus I had to find out a great deal about Paley, and also about Adam Smith, Ricardo, the Mills and all the rest of the 'English School' including Marx (Waterman 2007). Willy nilly, I became a student of classical political economy.

Emmett: *Describe your decision to work on the history of Christian Political Economy in the early 19th century.*

Waterman: It wasn't a decision. Like everything else I have done since 1980, including my technical studies of classical growth theory and even my work on Papal Social Teaching, it was an unintended consequence of the ever-increasing number of questions that I wanted to ask (and still want to ask) about Malthus and his *Essay*.

The theodicy of the first *Essay* was no good. Paley tried to help; Malthus himself abandoned it; Sumner showed that population pressures were not an evil but an incentive to moral and spiritual progress. Copleston and Whately, following Sumner's interpretation, raised the Malthusian argument to a new level of intellectual sophistication. Chalmers followed Sumner in his reformulation of Malthus's theodicy and used it to create a case for Church Establishment. 'Christian Political Economy' is simply the evolution of Malthusian theodicy from Malthus

(1798) to Chalmers (1832). After that it simply passes into the main stream of Victorian political thought.

Emmett: *The Christendom Trust funded a year of study for you. Can you describe their interest in your work, where you studied, and the year's impact on your work?*

Waterman: Well yes! It was they who funded my Reckitt Fellowship at the University of Sussex, for which I am deeply grateful.

But I am afraid I was a disappointment to them. The Christendom Trust was funded by Maurice Reckitt, who was part of a pre-war Anglo-Catholic, Christian Socialist group that included T. S. Eliot and Canon V. A. Demant. They established the Reckitt Fellowship at Sussex expecting that the Fellow would be a Christian Socialist; and that his research would provide support for their ideas which had been much influenced by R. H. Tawney. But what my research actually showed was that the most sophisticated political thinking in the Victorian Church – to which an Archbishop of Canterbury (Sumner) and an Archbishop of Dublin (Whately) made vital contributions – was strongly supportive of private property, free and competitive markets, and a high degree of social and economic inequality.

Emmett: *During the time I was in Winnipeg working under your supervision, you took a sabbatical at Cambridge. What did that sabbatical enable you to do?*

Waterman: It enabled me to write the first draft of my book on Christian Political Economy (Waterman 1991a).

But Robinson College, to which I had been elected as a Bye Fellow, did far more for me than that. In addition to congenial society and luxurious dining it provided a comfortable furnished three-bedroom suite in the college for my wife and me; and because I became a Senior Member of the College it continued to make these amenities available to me on all my subsequent visits to Cambridge until 2010.

Despite Keynes's great admiration for Malthus, the Faculty of Economics had no interest at that time in their famous forerunner. But they gave me an office that I shared with Cristina Marcuzzo. Though we got on well I didn't use it much because I made one of our three bedrooms in Robinson into a study.

It was on this sabbatical that I established working relationships with Edward Norman, Jonathan Clark and Graham Cole, revived my friendship with Donald Winch, and had fruitful contact with Stefan Collini and Quentin Skinner. I also renewed contact with my undergraduate college, Selwyn, and met its eminent Master: Owen Chadwick, Regius Professor of History in the university. Despite the fact that he was the world's leading authority on the Anglican Church, he told me that he knew 'nothing whatsoever about Malthus' – and seemed to think that was OK.

Emmett: *I found St John's College a rich and enlivening place to conduct research, think, and write. What aspects of it have enriched your work?*

Waterman: It would take too much space to tell you.

It has been my academic home since 1959. When I went to Australia in 1964, College Council overrode their bye-laws to grant me leave of absence for three years. I was warmly welcomed back in 1967 and given an office which I continued to use for the next 46 years. (I still have an office but I don't use it much now.) I continued to do all my teaching in the college until I retired in 2006, worshipped in the beautiful College Chapel, and played my part in the governance of our society. The college is the original part of the University of Manitoba (UM); and since 1970 those of its Fellows who teach in the UM Faculties have been paid by the University. But we are an independent corporation with our own charter, property and endowments, subject only to the Bishop of Rupert's Land who is *ex officio* our Chancellor.

Any theology I know I learned there, many of my closest friendships have been formed there, and I have always enjoyed and profited from the interdisciplinary character of our Fellowship. I have no objection to economists (quite literally, some of my best friends are economists!) but I thrive in a place where my colleagues are from other disciplines: theology, philosophy, mathematics, literature, history, music, and the other social sciences. At one time we had physical sciences too, but couldn't keep up adequate laboratories.

Emmett: *You worked as Director of the Center for the Humanities for some time. How did your experiences there shape your historical work in economics, and vice versa?*

Waterman: They didn't.

By 1992 the program of my own research and teaching was well established, and as Director I had no desire to influence the studies of others. I tried to welcome all contributions that could reasonably be regarded as 'Humanities' as that word is now understood in North American universities. [In more traditional universities *Litterae Humaniores* means the classical literature of Greece and Rome. It was the Renaissance option to the original field of university studies: *Litterae Divinae*.]

But in fact my chief work as Director was trying to ensure adequate funding for a branch of learning that is increasingly despised and rejected in the modern world.

Emmett: *I have heard you express your admiration for Paul Samuelson many times. What is it about Samuelson that has interested you the most? And how does that relate to your use of his rational reconstructions of classical economics?*

Waterman: Where to begin?

Paul Samuelson was the 'one exception': even more intelligent than Joan Robinson. (But he had great admiration for her. There was a large photograph of Joan outside his office in M-I-T and he told me 'I read everything she wrote. She only read a subset of my stuff.') Paul was far and away the most important intellectual influence and example of my entire life.

He taught me economics. When I went down from Cambridge I really understood nothing. So when I learned that I should have to teach the subject in 1959 I thought I had better find out something about it. Samuelson's textbook had been prescribed for First-Year courses at

the UM. I bought the book and devoured it from cover to cover with growing excitement – like a gripping novel. It was a blinding revelation! *All of a sudden I saw what economics was all about*; and everything I had superficially read about it at Cambridge suddenly came in to focus. Above all, I realised that economics is an essentially mathematical discipline – as Jevons had seen long ago – and that I had been a victim of Marshall’s pernicious bias against mathematics which continued to stultify teaching at Cambridge. For though there is no explicit mathematics in Samuelson’s textbook, it was obvious that his ingenious diagrams and arithmetical tables are thinly disguised algebra, calculus and difference equations.

I met Paul for the first time in 1975 at a small invited conference on ‘Keynes, Cambridge and the 1930s’ convened by Don Patinkin at the University of Western Ontario. Paul sat in the front row, covering sheets of paper with set-theoretic notation; but now and then he would look up and make some incisive remark. But we didn’t really get acquainted until 1991. I had written an article on Thomas Chalmers’s first and best book, reconstructing his argument mathematically to show its relation to Samuelson’s (1978) famous ‘Canonical Classical Model’ (Waterman 1991b). I sent him an offprint merely as a courtesy. To my astonishment back came a letter by return post beginning ‘Dear AMC’ with detailed comments. Thus began an exhilarating correspondence, rather like a strenuous tennis match, which now fills two boxes in the Samuelson archive at Duke University. (Paul actually played tennis every day until he was in his 80s.)

We continued to correspond for the next decade and met once or twice; then in 2002 when I was at Boston College he invited me over to MIT. He wanted to interrogate this unusual specimen: a man whose intelligence he respected – yet who was an unashamed and highly orthodox Christian. (He told me, ‘My wife used to say, “Whenever you hear the word Religion you reach for your gun”’.) And he couldn’t get his head around the fact that Adam Smith had subscribed to the formularies of the Church of Scotland. On that occasion, however, he said something that seems to me to capture the essence of the academic life: ‘I never bother to talk to people who agree with me: I learn nothing from them.’

Why though, would the world-famous Paul Samuelson bother to disagree with an unknown nonentity like me from a place no-one had ever heard of? I think it was a sign of his true greatness that he was completely without prejudice with respect to his fellow human beings: always willing and eager to learn from any.

We use that word ‘great’ far too often. But in Paul’s case it is appropriate. He was the only truly Great Man I have ever met. (Save that on one occasion I did shake hands with Lord Mountbatten: it was like shaking hands with a dynamo!) It was by friendship with Paul that I learned the nature of human greatness: enormous vitality securely harnessed to a coherent set of objectives. When someone asked that old curmudgeon John Sebastian Bach how he could write such glorious music he growled ‘I work harder than other men’. Paul Samuelson certainly did too. When he got the Nobel Prize he said ‘it was nice to be recognized for hard work’. For more than seventy years he produced scientific papers, many of seminal importance, at an average rate of one a month. And even in our sub-discipline of the History of Economic Thought (HET) he

was a towering figure: more than 70 articles, essays and memoirs, some of lasting importance. Many full-time specialists in HET have achieved far less (Medema and Waterman 2014).

But what interests me most about Paul and his work is his Harvard doctoral thesis of 1940, published as his first book: *Foundations of Economic Analysis* (1947). Since Adam Smith, economists had always believed that they were doing ‘science’. Theory is prior, but it must be tested by observable facts. The question was always, ‘how’? Samuelson showed how ‘meaningful theorems’ -- which could be refuted by empirical data -- could be deduced from maximisation principles and stability conditions. One hundred-and-seventy years of loose talk about ‘science’ was finally justified (Waterman 2019/20). This astonishing achievement by a twenty-five year old graduate student was more than a mere *tour de force*. Over the next half century it profoundly changed the way we all do economics. Samuelson was a ‘great man’ by any reckoning. He was also a creative genius.

More important than any of all this, Paul was a good, kind and truly lovable man.

Emmett: *Your more technical explorations of the work of classical economists may be described as rational reconstructions. How do rational and historical reconstructions improve each other? Do they? Are they separate exercises?*

Waterman: I wrote about all this in my Malthus bicentenary article (Waterman 1998), contrasting Winch’s ‘intellectual history’ (IH) with Hollander’s ‘history of economic analysis’ (HEA) and arguing that these are complementary inquiries. Together these comprise a sub-discipline we call the ‘history of economic thought’ (HET). For as *historians* we need to know how and why the literature of political economy came into existence (IH), and as *economists* we need to explore and understand its analytical content (HEA). Samuelson’s work in our sub-discipline is the most brilliant and revealing HEA so far attempted.

But I never use the vague and disputed terms ‘rational’ and ‘historical’ reconstructions unless compelled by others I have to defer to – such as the late Warren Samuels, Founding Father of our sub-discipline. Warren got me to write the most boring piece of my entire output (which is saying a lot) based on a hideous Venn diagram with no fewer than fourteen intersecting classes (Waterman 2003b). Like Samuelson I do attempt *mathematical* reconstructions of the analytical content of important work by dead economists.

Why? Because mathematical reconstructions of the work of our great predecessors can throw light on what they thought they were doing, and in some cases can help the historian understand what they were disagreeing about and who – if any – got it right. For example, I have lately attempted to show exactly how and why Malthus disagreed with Adam Smith about high wages, which was only possible to do by elaborate mathematical reconstruction (Waterman 2012).

Emmett: *You have worked at several points with your graduate school friend Geoff Brennan. What projects have you done together, and how did the two of you work together? What, if anything, has Geoff taught you about religion and economics?*

Waterman: Geoffrey Brennan was an undergraduate – in Honours Economics -- when I was at the ANU. We both sang in the university chamber choir (all undergraduate except for me) and we attended the same church in Canberra, where he had to listen to my sermons. How did an undergraduate get into an all-graduate university? Because Canberra University College, established in 1929, was integrated into the ANU in 1960 as the School of General Studies.

But Geoff was no ordinary undergraduate. We would walk around the campus in lunch hour and he would explain to me that Australian macroeconomic policy – which engaged the attention of every leading economist in Australia and to which my own research was committed – was without theoretical justification. He was right.

His subsequent career in public finance led to public choice theory, his move to the USA, his influential collaborations with James Buchanan and Gordon Tulloch, and his increasing attention to political theory and philosophy – in each of which he has earned an international reputation. When he ‘retired’ two or three years ago he was simultaneously Professor of Economic Theory at the ANU, Professor of Philosophy at UNC Chapel Hill, and Professor of Political Science at Duke. Only Harry Johnson has had such a peripatetic career.

We continued friendly correspondence when I left Australia, but did not meet again until the year after I returned from Sussex. He then put me in touch with Paul Heyne, with whom I organised two invited conferences in Vancouver on ‘Religion, Economics and Social Thought’. Geoff was there of course (as were Milton Friedman and Peter Bauer). Over the next two decades he, Paul and I became a closely-knit *troika*: three Anglican economists, deeply interested in the relation between economic theory and Christian theology in public policy discourse. We had closely similar views on Anglican religion, the nature of economics, and the strengths and weaknesses of capitalism and the market economy. We felt that together we were more than the sum of the parts; and when Paul died suddenly in 2000 both Geoff and I felt diminished (Brennan and Waterman 2008a).

Geoffrey and I had collaborated in an edited book of essays on ‘Economics and Religion’ (Brennan and Waterman 1994), and we collected, edited and published the best of Paul Heyne’s papers in this field (Brennan and Waterman 2008a). We edited and wrote a joint article for a collection on ‘Christian Theology and Market Economics’ (Brennan and Waterman 2008b). But our recent and current collaborations arise out of Geoff’s close association with UNC and Duke. During the six months he spent in Durham NC every year he would convene small, Liberty-Fund-style conferences on ‘PPE and Literature’. (Geoff’s assignment at UNC and Duke was to establish a joint Oxford-style program in ‘PPE’: Politics, Philosophy and Economics). He invited me every year after 2011. A book or books would be assigned for us to read in advance. About 16 or 17 of us sat round the table for two days and discussed the readings – with plenty to eat and drink at the right times. After Geoff ‘retired’ he remained *persona grata* at Duke and UNC and continued to run the conferences. In 2018 we read *Robinson Crusoe* and in 2019 *War and Peace*. Geoff and I collaborated in articles on each: ‘Faith and Economics in Robinson Crusoe’ currently under review, and ‘Economics Meets *War and Peace*’ (Brennan and Waterman 2020).

What did he teach me about Religion and Economics? At the merely academic level he is better informed about Economics than I, and I am better informed about Religion than he. So in our collaborations we have a fruitful division of labour. But I have learned so much from him about everything over the past fifty-five years that it would take a long time to answer this question properly.

Emmett: *What are you working on now?*

Waterman: ‘A General Malthusian Model of Ecological Equilibrium’. Back to Malthus once more, and back to my first love, science.

I have constructed a model of what J. S. Mill called ‘the spontaneous order of Nature’. Each species coexists with all other species, some of which serve as food. Equilibrium exists when all populations are stationary because production/income is at the Malthusian ‘subsistence’ level. Specific production functions contain the populations of all species as arguments with positive first derivatives. If there are diminishing returns, the specific second derivative will be negative. I have investigated the existence, uniqueness and stability of general equilibrium at the species level; and so far as I can see, diminishing returns (implied by Malthus’s famous ‘arithmetic ratio’) are sufficient for local stability of the linearized system. The model generalises a lot of traditional formulations, such as the Volterra-Lotka equations, as special cases.

Most of this work was completed by 2007. I had to set it aside because of a series of cancer operations; and then other, seemingly more urgent, academic projects kept it on the back burner. But now at long last I can get back to it.

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SUPPLEMENTARY MATERIAL

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