

REFLECTIONS ON THE DAY

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1. At the office

Each day has its own menu, a sandwich of activities that are governed largely by location: before, during, and after the office. At the center of the sandwich is the university office, in my case the Cowles Foundation, a fine three-story building on a street in the town of New Haven that Charles Dickens once called the nicest street in America. There are long days and short days. A long day starts before the a.m. rush hour at 6:30 a.m. and lasts till 7:30 p.m., travel times that help to ensure a smooth commute to my home and family some 20 miles away in the rural town of Madison. New Zealander that I am, my home must not be too far from the ocean (albeit in this case the grey North Atlantic). Short days are sometimes dictated by the timetable of my children's school bus and they last from 9:00 a.m. to 3:00 p.m. Not all days take me into New Haven and those days offer peaceful islands of research, reading and writing at home, punctuated by the telephone, e-mail and nowadays the occasional controlled eruption of a fax machine.

Daily activity is governed by main events — committee meetings, teaching class, seminars and periods with my students — and the remaining time is spent in correspondence dealing with what is often a mountain of mail, some e-mail and regular incursions of faxed documents which bear the signature of a deadline that is being transferred from one office to another at the latest moment that modern technology allows. All of which conspire to increase the metabolic rate of academic life, sometimes to unhealthy levels. On a tough day my secretary and I will put out forty odd letters, about ten e-mails and a few faxes. On a quiet day we manage two or three of each and bring our Paradox data base and files up to date.

Much of the volume of mail and office activity comes from editorial work of one kind or another, scholarly evaluations from outside the walls of Yale, refereeing requests, enquiries about research, visits, conferences and so on. Some days we get caught up with our office work completely. But each new mail brings fresh burdens and we treat them philosophically — what does not get done one day waits till tomorrow. And house rules that I have instituted help us to decline with courtesy excessive demands on my time that roll in from the outside. When our pile of outside requests for evaluations or refereeing gets too big, we

reply to the effect that we cannot get to the new letters or reports in a reasonable time with apologies to all concerned. Our rules put all requests in chronological order but we exempt from this my former students and colleagues, all of whom receive a priority status.

What is it that makes daily life at the office so special? The answer for me is simple — the library, my students and my secretary, Elizabeth, and my manuscript typist, Glenna, who has keyboarded all my technical research papers over the last fifteen years. As far as library facilities are concerned, the Cowles Foundation is very fortunate. In the early years of the Cowles Commission some inspired decisions were made about journal subscriptions and book purchases. In recent decades we have worked hard to build up strong collections in statistics, probability and relevant areas of mathematics, as well as econometrics. As a result, we now have journal stacks and a specialist technical library that constitute an enormous intellectual resource. The books are simply a delight and they are literally just around the corner from my own office. It is certainly a privilege for me to work in such an environment, educated as I was in New Zealand — so far away from the major centers of learning in North America and Europe — where it seemed in the 1960s, when I was a student, that *Econometrica* arrived six months later than it did in the rest of the world.

2. With my students

The greatest joy of my daily life at the office comes from my Ph.D students. Working with students and helping them to get going on their research brings me a great deal of satisfaction. I see no better way of achieving this than the apprenticeship system that served the crafts and trades so well and for so long. Working at the research bench together gives motivation and direction on the daily basis that is so often needed. But, more importantly, it helps to resolve what is usually the biggest obstacle to a beginning researcher: to a student the published literature looks like an ice face, with no hand or foot holds to start the climb up. Facing a blank sheet of paper for the first time and lacking technical confidence, it's no wonder that the first few equations are hard for a student to write down and, when the equations finally do get written down, they are usually a terrible disappointment. Enough to discourage and delay many a new researcher. But when students come into an ongoing project, or when they are present at the very beginning of a piece of research, they soon come to see that the ice face is full of fissures and flaws that make it interesting and accessible. And the first few equations help to show what is needed, even if they are naive or wrong. Overcoming this embarrassment is the first step in moving forward in research and it helps to give courage to the fainthearted.

In the early stages, this support system for the new researcher is labour intensive. It takes up a good deal of my personal time, sometimes at a daily level. My door at work must always be open to students when difficulties arise, and I often spend time at home writing out technical arguments and laying down research agendas to get students started. But it is rewarding for me to share the joy of research work and to have the additional pleasure of watching a student's independence and capabilities grow with time. An important positive externality is that it is often fun to work together on a project, and this is gratifying because academic research can be a lonely profession with long hours devoured in the pursuit of goals that all too frequently turn out to be elusive. To survive this hardship we need the instinct and determination of a lone wolf, a characteristic that our modern educational system does little to foster. An interesting phenomenon I have discovered in my work with students in their research apprenticeships is that the enthusiasm generated in communal endeavours tends to spill over to research tasks that are more complex and that require more of the sustained effort of the lone wolf. So students are helped indirectly as well as directly with this system.

Another feature of the apprenticeship system is that it keeps alive the joys of my own first research work in Auckland, New Zealand. Co-existing with the new are fond old memories of a small group of masters students battling tough exams and research projects late into the night and making evening migrations for food to the famous New Zealand pie cart — (a cart that was towed into downtown Auckland to offer the sole source of food in the evening to a city of 400,000. A cart where students and night shift taxi drivers would mingle for a few minutes together, the only life in town after the last bus left at 11:30 p.m. And in the morning the cart would be towed away leaving no sign of the nocturnal, and nothing to pollute the existence of the city at day. That was all long before the fast food chains made it to the antipodes and brought with them their own different subculture) — and sharing aspirations of what it would be like to study at ENSEE in Paris, LSE, Stanford, Chicago, or Yale. A few golden moments that make the student sacrifice worthwhile.

3. Where are the glittering prizes?

A famous economist recently stated that the greatest prize of academic research is applause from one's peers - solving a problem that others (sometimes your teacher) couldn't solve, being first on the deck in a new field and so on. I have no doubt that concerns like this do motivate some people. But the real prize of academic work is the privilege, freedom and fun of working on subjects of one's own choice. The joy of research for me is the work itself, irrespective of peer evaluation. The pleasure that comes from unlocking a technical argument, the

excitement of seeing a new way of looking at an issue, the satisfaction of drawing different matrices of knowledge together in a productive way. Therein are the prizes, and the sooner an apprentice learns to appreciate this the better (especially with today's processing delays of more than a year at some of the best journals). If you are going to give your life's work to a subject, then you had better like what you are doing or else a lot of long lonely nights will be wasted for the vanity of an applause that may never come.

Recently for me, a simple but deeply satisfying task of research has been writing computer software to do simulation and empirical work with new econometric methods that I happen to be developing. A typical scenario here is to develop the first version of a procedure and begin to analyze its asymptotic properties. Once these start to look interesting one can set up a simulation — program to try the method out. Later on, the program can be polished up and the method used in empirical research. As a novice empirical researcher, that means for me an exhilarating nervous anticipation. In these exercises one quickly learns that canned statistical and econometric software packages are not helpful. Instead, I use the matrix programming language GAUSS, which is fast, easy to write, and has an adequate graphics capability at least for most of my purposes.

4. Reading and research

Growing demands at the office have meant that it is more than a decade since I've been able to do research at the university. This seems like a sad commentary on university life in the 80s and 90s but I am afraid that it is true. There are few periods in my office at work that go uninterrupted — even 15 minutes peace is unusual these days — and painstaking technical work is simply impossible in such an environment. But there is time for reading and it's efficient for me to use lunch and tea breaks to do catch-up reading in periodicals and do library searches for research that I have in the pipeline. Since I always bring a packed lunch box to work, it is easy for me to use time in this way. It's also fun to go off to the main library and see what's new there too.

Striking a balance between reading and writing is very important to me. Too much reading and you never have any time to write. But without a steady reading programme it's easy to lose touch. What you read is much more important than how much you read. No one can read all the mathematics that has been written. What parts of it you read and retain for your own use is ultimately what counts. Since the time I was a student I have always set aside some time to read mathematics. I've enjoyed it and it has been very useful to me. Like most econometricians, I now have to spend a lot of time with computer manuals, which certainly cannot be classified as edifying reading matter and which are often more frustrating than they are enjoyable. But they are necessary if you are to stay up-

to-date and capable as a practitioner. The quickest way to lose touch is to assign all the routine tasks like computing to others. That's one of the dangers of having research assistants and, incidentally, one of the reasons I prefer to have my students work as associates with me rather than for me.

For my personal research work, time at home has become a precious commodity that I like to manage very carefully. Most often I keep several projects going at the same time. Some of these I set up as projects with students that are tailored to their strengths and interests. Others are pieces of work that I have had under way for some time and that are in various stages of completion. Technical work I like to keep for periods when I have a long stretch of uninterrupted time. And often that means working at night, sometimes late.

Right now I am working on two different classes of problem. The first is concerned with an asymptotic theory of Bayesian inference, model selection and prediction. This work has empirical applications that I have become quite interested in and it involves a lot of software development. Over the last year I've spent nearly a third of my research time on writing computer programs. That's the biggest fraction of my time on this activity since I was a graduate student at Auckland University. The second project I have under way is the development of regression methods for time series that can take advantage of nonstationarity and potential cointegrating links between series without having to be explicit about their form or the dimension of the cointegration space. It seems that the likelihood is locally asymptotically mixed normal (LAMN) only if the dimension of the cointegration space is known. If it isn't, then the likelihood is more complex in form and this affects the extent to which we can validate statistical inference by asymptotic arguments. Regression methods that are not based on the likelihood seem to have some advantages here.

5. Travel

Recent years have given me a lot of travel opportunities. For the last three years I have travelled about 80,000 miles a year. That seems a lot of time up in the air and it is — probably around 160 hours *in toto* or a normal working month up in the air, not counting airport and connection time. But two trips to New Zealand from the east coast of North America will put on 50% of that total so it is not as much as it may seem, at least in my case. More important to me than the amount of travel is the amount of time I will have to be away from my family. Therefore travel commitments are joint decisions that my wife, Deb, and I make together. Deb checks my conference and seminar diary and has presidential veto power over all my travel. If Deb thinks my schedule is too tight, it gets changed.

I like long trips — they are an opportunity to read some good fiction and think about future research plans - and it is especially pleasant when the trip takes

me home to see my mother and revisit my native land during a New England winter.

6. Avocations

Foremost are my wife and family of three children. Home is a happy place which is the source of all my energy and motivation. Achieving a balance of family life and research work is not easy, especially in the face of deadlines and impending conferences. I wish I could say that I get to all Justin's little league baseball games, Daniel's varsity soccer games and Lara's horse riding shows, but I don't. And I think I am the poorer for it.

My principal avocation is construction, which I have loved since the vacations I spent as a student in New Zealand working on building sites, up scaffolds, in lumber yards and in joinery factories. I also love tools and over the years I have collected quite a large number of them. The most interesting intellectual aspect of this work has been the different building, electrical and plumbing codes that I have encountered and had to learn as I have lived and worked in New Zealand, England and the United States. Three countries and three entirely different codes, not like the universality of econometrics at all. After I came to Yale in 1980, the first job that I was offered was as a plumber, and I have subsequently had job offers as a carpenter and electrician. Most vacations I spend a good deal of time on activities of this type and generally find it good exercise and good fun. Even auto maintenance and repair has its good moments - a quick look at workshop troubleshooting manuals will convince even a skeptic that diagnostic analysis for a modern automobile with electronic engine control is much more sophisticated and, dare I say it, more reliable than econometric regression diagnostics. But, of course, the economy is also much more complex than a car.

My final love is a good read. Sadly, normal days and weekends now offer little opportunity to read fiction but air travel does, so happily I do get to read some novels each year. Fewer than I would like, but enough to provide a temporary escape from the language of econometrics and make it all the more interesting when I return.

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