Remarks[*] on "development and growth" by Nicholas Stern[**]

for Jim Mirrlees' Memorial Conference

at Nuffield College, Oxford

26 April 2019

1

*

.

I. INTRODUCTION

Jim was special; he was different. He changed so much of what he touched for the better and in such creative ways, including the lives of many here today. He chose to work on the big issues: the processes of development; overcoming poverty; growth; distribution; the fundamentals of incentive structures; and much more. He was deeply serious about his subjects and insisted that arguments had to be well framed and sound. Rigour mattered hugely; and he would follow where the arguments took him.

I met Jim in the summer of 1967 via an introduction from Dick Goodwin. Dick was the economics tutor at Peterhouse where I had done three years of, and a degree in, mathematics. Dick was not encouraging about the value of studying economics. When I persisted he told me I should see Jim. It was a moment of great good fortune for me. Peter Hammond and Oliver Page switched over from mathematics in the same year and, like many of Jim's students, we remained good friends.

At our first meeting, Jim recommended Schumpeter and Keynes for summer reading, and I have often passed on that recommendation to those beginning economics.

I want to talk about the decade from 1967 when I was close to him throughout, before I moved to Warwick in 1978. We remained friends for 50 years, including the Hong Kong years with Patricia, but I would like to focus on the years when I worked most closely with him.

II. SUBJECTS

In that decade Jim's research was primarily in four areas: (i) optimum taxation (including asymmetric information); (ii) uncertainty and growth; (iii) development and the Little/Mirrlees approach to project appraisal and planning; (iv) optimum growth. Others today, including Peter Diamond, whom we have just heard, cover the first two areas, together with topics such as pensions and tax reform which occupied him subsequently. I will concentrate on the last two, where I was directly involved as a collaborator and participant. But notwithstanding the collaboration, which I enjoyed immensely, I always saw myself as a student of Jim.

Of course, Jim did spread wider during the decade from 1967, for example, he showed that with increasing returns or indivisibilities people who were *ex ante* equal could be treated unequally in an optimum. Thus, in a town (*Swedish Journal of* Economics, 1972) with a centre where people worked (it had such a centre because production involved indivisibilities), those closer to the centre would, in the optimum, have higher utility. And, when productivity depends on consumption, a family

might allocate higher consumption, to increase work-effectiveness, and higher workload to some members (Mirrlees, 1975).

III DEVELOPMENT AND LITTLE/MIRRLEES

The desire to understand and contribute to development and overcoming poverty was central to Jim's switch from mathematics to economics. The most important part of his work on development was his work on project appraisal and planning with Ian Little (1969, 1974). Let me highlight five aspects of that work.

(i) *Little/Mirrlees as part of an approach to development*

For Jim, the Little/Mirrlees method was part of an approach to growth, structural change, distribution, and development strategies. Further, political issues and constraints were at centre-stage. For example, in relation to growth and distribution, the specification of the shadow wage in their method embodies both a premium on public sector surplus, which could be invested for growth, and a valuation of the increased incomes to workers as a result of employment, which would be higher the poorer their origin. The political issues and constraints come, for example, into the specification of which goods were allowed to be traded, although that issue could be changed by the application of their analysis. More on the method below.

(ii) *The influence of his time in India in 1962-63*

He was clearly greatly influenced by his time in India in 1962/63. We talked of it often and he encouraged my lifelong commitment to India, which began in 1974. In shaping perspectives on development in the 1960s, India was of particular importance. The first five-year plan (1951-56) was a collection of projects and broad intentions; it went reasonably well. But it was not really a coherent strategy. The second plan was the most famous one, with a clear approach to development strategy and foundations in the Mahalanobis model. It attempted to direct investment in the economy to heavy industry and to "machines to make machines". It was heavily influenced by the experience and approaches of the USSR. The third plan was disrupted by war with China in 1962, the death of Nehru in 1964, followed by increasing skirmishes and then war with Pakistan. There was a "planning holiday" in 1966-69.

At the same time, the East Asian tigers were starting to move on the back of export-led growth. The problems of India's inward-looking strategy and the East Asian successes strongly influenced the fundamental approach of the Little/Mirrlees method. It embodied a strategy for development founded on serious reservations about import substitution and directive

planning. It saw both the opportunities in world markets and the importance of careful project selection. In discussion of the method and of development strategy, examples of projects which made big losses when evaluated at world prices were often invoked, drawing, *inter alia*, on the work of Little, Scitovsky and Scott (1974).

The Little/Mirrlees method had as its starting point the use of international prices as shadow prices for traded goods. The shadow wage was the marginal product of labour elsewhere, as noted above, adjusted for a premium on investible surplus and for concerns in relation to distribution. The shadow prices for non-tradeables were calculated using the idea that they should be equal to the shadow cost of production. That shadow cost of production depended, of course, on other shadow prices, hence there were simultaneous equations for the shadow prices of non-tradeables, and there was strong use of Leontief input-output data in their calculations. What was traded or non-traded depended on assumptions about the political economy and development strategy of the country; part of the story was to push for more goods being traded and the application of the method would generally point in that direction. All this underlined something central for Jim; policies shaped shadow prices, and shadow prices shaped policies (as well as the selection of projects).

(iii) ***Theoretical context***

Jim was working at the same time with Peter Diamond on optimum taxation and production efficiency. Note that Jim always preferred optimum as both adjective and noun, but yielded to optimal (in the case of adjective) for publication in the *American Economic Review*. The importance of production efficiency resonated with the idea of shadow prices as guiding to a production frontier.

Jim saw the theories of optimality and reform as much the same (the optimum was a place from which there was no beneficial reform). Here he embraced the idea of shadow prices as guiding reform, on which James Meade was so clear. Jim valued James Meade's work very highly and particularly the mathematical supplement to Meade's Trade and Welfare.

The link of shadow prices to the theory of reform was very clear in his 1969 *Pakistan Development* Review paper on valuing national income. Jim showed that a vector change in net outputs of *dx* represented an improvement in welfare if $\mu.dx$ was positive, where μ was the vector of shadow prices. Hence the argument for evaluating national income (or change therein) at shadow prices.

(iv)   *Tea in Kenya*

Jim and Ian Little encouraged me to go with Maurice Scott to Kenya, to do an appraisal on small-holder tea. This was an innovation in the application of the Little/Mirrlees method because it had been originally designed for industrial projects. It was an innovation too in approaches to development in extending tea, traditionally a plantation crop, into small-holdings, in this case primarily cultivated by women. It was enormously instructive for me. It taught me about entrepreneurship, infrastructure, the importance of agricultural extension and administrative effectiveness, and how aid could be done well. It was a public-private partnership (and in the 1960s, well before that language became widely used) with private cultivation at the early stage of the production chain, then private tea factory and marketing at the end of the chain, but with a lot of public sector in the middle. With Jim's encouragement, it went into my thesis and became my first book.

(v)   *Influence of the Little/Mirrlees method on the profession*

At the start of the Little/Mirrlees work there was a lot of pushback in the profession, some of whom saw it as the return of neoclassicism. There was, for some, a mistrust of market allocation and a strong attraction to the more rigid economics of central planning. Some of that was influenced by the successful mobilisation of the UK wartime economy. The Latin-American centre-periphery perspectives saw limited future in agriculture as a driver of growth (seen as having low marginal revenues on world markets). The infant-industry argument was popular. Little and Mirrlees, whilst acknowledging some of the issues raised, emphasised the deeply problematic structures and projects that had arisen as a result of controls (particularly around imports), and the diversion of entrepreneurship into the cultivation of government and in the seeking of privileges. Like Jim, Ian Little and Maurice Scott were never market fundamentalists. They did, however, have a clear view in the 1960s and 1970s of necessary directions of reform, i.e. less import control and licensing of investment and more market. The profession swung to market fundamentalism in the 1980s and 1990s, and Jim was clearly unhappy with that. He could see the appropriate structure of reforms in the 1960s and 1970s, but he saw through the naïve fundamentalism of the claims that (almost) everything should be left to unfettered markets.

On development strategies, I think the profession is now, on the whole, in a somewhat more thoughtful and nuanced place; markets and international trade are prominent but with an understanding of market failures, the dynamic importance of learning-by-doing, the role of

infrastructure, the risks of financial instability and so on. These require active government policy, including for the promotion of key processes of change, much of infrastructure (either ownership or regulation), managing major risks, for example with capital controls, building networks, tackling environmental externalities and so on.

Jim did not show the great swings and lurches seen elsewhere in the profession. Whilst constantly learning he was, steadily, in a sensible place on development strategies. I think, with hindsight, the ideas and approaches of Little-Mirrlees were a key part of learning for the profession and helped us to find more balanced and productive perspectives on development.

IV GROWTH

Jim was always inviting you in, as he worked so originally on the very big issues. He encouraged me to pursue both the development interest and the more mathematical side of growth. Indeed, he encouraged me to put the two together in the chapter in my thesis on optimum growth in a dual economy.

Jim drew me into the 1970 Ma'ale Hachamisha (Jerusalem) International Economic Association (IEA) growth conference. We edited the proceedings together in the book Models of Economic Growth. People still published important articles in conference volumes then, and the IEA conferences had a high profile. Bob Solow, Frank Hahn, Peter Diamond, Christian von Weizsäcker, Eytan Sheshinksi, Manny Yaari, Avinash Dixit, Karl Shell, Luigi Pasinetti (with some discomfort in the mathematical company), were all there. Frank and Bob in their forties, the rest of us much younger. I am thinking now of revisiting the fostering of technical progress, because we need so much discovery and diffusion of new technologies to act on climate. We need the best of the young to be working there.

Let me run through some of Jim's contributions on growth. He did not publish much, but it was all original and important.

(i)   Kaldor-Mirrlees, 1962: his first published paper. This involved the introduction of a technical progress function into a fixed coefficients model. Productivity growth increased along with rate of change of capital. It has, I think, some of the ideas of the much later "endogenous growth" theories. It is clear that Nicky Kaldor could not have done this without Jim (aged 26 when it was published).

(ii)   Five years later, in 1967, he published "Optimum growth when technology is changing". Not for Jim the mechanical application of the Pontryagin method (derived from optimal control theory). Jim wrote down the problem and worked out the solution from first principles. In so doing, he proved that his calculated path was optimum and not simply that it satisfied necessary conditions for optimality. He showed the importance of the shadow value of capital tending to zero and gave it an economic interpretation (rather than just as a mechanical "boundary condition"). And he saw the link between the failure of the shadow value of capital to approach zero and the non-convergence of the utility integral and the associated problem of "over-saving" (i.e. accumulating "excess" capital). Both his mathematics and his economics were better than most others working on optimum growth.

(iii)   The paper"agreeable plans" (1973), with Peter Hammond was in the "J*erusalem*" volume, together with the one with me on "fairly good plans" in *The Journal of Economic Theory*, 1972, showed Jim thinking beyond the narrow optimality definitions. For "fairly good plans", Jim came up with the idea of the "balanced growth equivalent" (BGE) as a way of calibrating utility integrals so that one could ask, in an understandable way, the question whether simplifying choices led to substantial or small cost in what could be achieved. The BGE of some given consumption path was the starting level of consumption which, if it grew at the constant underlying growth rate, would give the same utility integral as the given path. We used it much later in the Stern Review (2007).

(iv)   Jim's PhD thesis should have had more prominence, as it was very original on optimum growth under uncertainty. It probably had many of the ideas that emerged later, to great acclaim, in the finance literature. He did give it some airing in a paper in a volume edited by Jacques Drèze in 1974.

(v)   The idea for the paper "Optimum savings with economies of scale", with Avinash Dixit and me (*REStud*, 1975) originated with Jim. Again, he was going beyond standard production functions and asked about optimum size and timing of investment when fixed costs of production force investment to be lumpy. He gave Avinash and me a copy of a typescript with many of the basic ideas as we went off on our first Oxford sabbatical to work with Bob Solow at MIT.

Overall perspective on Jim's work on development and growth

Jim always brought something different to the table. A few examples, there are many more:

- doing optimum growth via integration by parts of the basic differential equations and combining long-run (transversality) end conditions to get sufficiency, rather than appealing mechanically to necessary conditions "imported" from optimal control theory

- bringing non-convexity into the "optimum town" and into the relation between productivity and consumption to show that an optimum allocation within an *ex ante* group/family of identical individuals could embody inequality (see above)

- in "fairly good plans" and "agreeable plans" Jim was going beyond simple-minded approaches to optimality and seeking "good results"

- doing the difficult mathematics for the optimum income taxation paper "with his bare hands", in the language of the admiring mathematics Fellow at my Oxford college, St Catherine's, with whom I shared the paper.

V. INFLUENCE ON OXFORD

At first, Jim encountered some resistance from the 'old guard' (some of whom were not old). This arose, I think from a combination of intimidation (from his brilliance and his maths) and, in some cases, from ideology. Because he was mathematical, some saw him as irretrievably neoclassical. He changed Oxford graduate teaching very quickly, through the BPhil/MPhil courses. And through the students and faculty he attracted and nurtured.

He attracted teaching staff like the wonderfully talented Avinash Dixit. His students, such as Kevin Roberts, John Kay, Sudhir Anand (and myself), quickly gained fellowships as the colleges recognised Jim as the future. Whilst he himself influenced the graduate teaching, his students-turned-fellows started to influence the undergraduate teaching. And many of his students, who decided to go elsewhere, had splendid careers, such as Margaret Bray, Paul Hare, Jerry Hausman, Jim Poterba, Jesus Seade, and many more. And it is interesting to note that they were all very different in their contributions. Jim sought, appreciated and nurtured talent: not for Jim any cookie-cutter or straightjacket.

The visitors he attracted were extraordinary – the very best. They included Bob Solow, Peter Diamond, Ken Arrow, Joe Stiglitz and many more. They had a profound influence on us all.

The Friday evening seminars in Nuffield became an institution – we all gathered. It seemed that everyone spoke. I remember Angus Deaton, Bob Solow, Ken Arrow, Terence Gorman, Orley Ashenfelter, Gerard Debreu ... So many memories: Gerard Debreu was asked what would be the consequences if, in your model, an equilibrium did not exist. He thought for a few moments and said "revolution". At that point we realised that, though an elegant theorist, his feeling for economics had some limitations. Orley Ashenfelter could not resist telling us (when speaking on the value of time) that Swedes completed their sexual activities faster than others because their wage rate was higher. And Jim once surprised us all by pointing out (in a seminar on the choice of family size) that we had to take account of the fact that many people found the act of procreating rather enjoyable (this was the apparently puritanical Jim enjoying teasing us, and with a face that was deadpan).

VI INFLUENCE ON STUDENTS

Jim was an extraordinary supervisor. He offered huge amounts of his extraordinarily valuable time. He advised us to think big, work small; thus tackle the big issues but work on getting detail right. He was enormously generous in giving us his ideas. He demanded rigour, but gave encouragement. His personal kindness was special. When my then-girlfriend (and now my wife, Sue, of more than 50 years) came house-hunting in Oxford from Cambridge in the late summer of 1968, Jim and Gill, who had moved a couple of months earlier, offered us a room – indeed, they sent Catriona or Fiona to ask whether it was to be one room or two. And Jim offered us a loan to tide us over (which fortunately we did not need). When my DPhil came through, Jim and Gill took us to Raymond Blanc, then, with his first restaurant, in Summertown. It took me some time to discover that all this was very unusual for a doctoral supervisor.

VI CONCLUSION

For so many of us, Jim was a guide in life. We asked ourselves 'what would Jim have done or advised?' In my speech for his first honorary degree in Warwick in 1982 (in Coventry Cathedral), I offered the observation that Jim would be horrified to see any of his friends behaving like the relentless self-interested maximisers in his models.

So many of us here can testify how fortunate we were to have Jim as supervisor, teacher, colleague and friend. He profoundly changed my life professionally, including my perspectives on the world, concepts, and ideas; and personally. There are many in the room I am sure who could say the same.

Through his work, life, students, colleagues and friends, he leaves an extraordinary legacy.

REFERENCES

Dixit, A.K., Mirrlees, J.A., and Stern, N.H. (1975). "Optimum Savings with Economies of Scale", Review of Economic Studies, 42 (July), pp.303-325.

Hammond, P.J. and Mirrlees, J.A. (1973). "Agreeable Plans", in Models of Economic Growth, ed. J.A. Mirrlees and N.H. Stern for the International Economic Association (Macmillan), pp.283-299.

Kaldor, N. and Mirrlees, J.A. (1962). "A New Model of Economic Growth", Review of Economic Studies, 29 (June), pp.174-192.

Little, I.M.D and Mirrlees, J.A. (1969). Manual of Industrial Project Analysis in Developing Countries, Vol.II: Social Cost Benefit Analysis (OECD, Paris).

Little, I.M.D and Mirrlees, J.A. (1974). Project Appraisal and Planning for Developing Countries (Heinemann, London and Basic Books, New York).

Little, I.M.D., Scitovsky, T. and Scott, M.FG. (1974). Industry and Trade in Some Developing Countries. (Heinemann, London and Basic Books, New York).

Meade, J.E. (1955). Trade and Welfare, Volume 2 of The Theory of International Economic Policy (Oxford University Press). Reprinted 1962.

Meade, J.E. (1955). Trade and Welfare: Mathematical Supplement (Oxford University Press).

Mirrlees, J.A. (1967). "Optimum Growth when Technology is Changing", Review of Economic Studies., 34 (January), pp.95-124.

Mirrlees, J.A. (1969). "The Evaluation of National Income in an Imperfect Economy", Pakistan Development Review, 9 (Spring), pp.1-13.

Mirrlees, J.A. (1972). "The Optimum Town", Swedish Journal of Economics, 74, pp.114-135.

Mirrlees, J.A. (1974). "Optimal Accumulation under Uncertainty: the Case of Stationary Returns to Investment", in Allocation under Uncertainty, ed. J. Drèze (Macmillan), pp.36-52.

Mirrlees, J.A. (1975). "A Pure Theory of Underdeveloped Economies, Using a Relationship Between Consumption and Productivity", in Agriculture in Development Theory, ed. L. Reynolds, Yale University Press.

Mirrlees, J.A. and Stern, N.H. (1972). "Fairly Good Plans", Journal of Economic Theory, 4(April), pp.268-288

Stern, N. (2007). The Economics of Climate Change: the Stern Review, Cambridge University Press, 2007.