

James Mirrlees (1936-)

Huw Dixon

Abstract

Mirrlees was trained as a mathematician at Edinburgh and then Cambridge where he switched to economics. His early work was on continuous time growth models. After moving to Oxford he applied the techniques to optimal taxation of income and commodities, the former of which merited the Nobel Prize in 1996. He also had an abiding interest in development, adapting cost-benefit analysis for developing economies with market distortions. Later in his career he was also involved with policy, in the IFS Mirrlees Commission on Taxation ('The Mirrlees Review') (2010) in the UK and as an advisor to the Scottish government. Since 2003 he has been based at the Chinese University of Hong Kong, and is currently Master of Morningside College.

Keywords

Optimal tax; Nobel Prize; growth; development; mathematical economics; Scottish.

Contributor

Huw Dixon

Huw Dixon has been Professor of Economics at Cardiff Business School since 2006, having previously been at Birkbeck, Essex, Swansea and York. His main fields of interest have been new Keynesian economics, bounded rationality and oligopoly theory. His Ph.D. on Bertrand-Edgeworth oligopoly was completed under the supervision of James Mirrlees. One of his current research interests is in developing a continuous time model of entry in a dynamic general equilibrium model.

32 (subject to change)

James Mirrlees (1936-)

Huw Dixon

1 Introduction

Sir James Mirrlees was born in 1936 at Minnigaff, just outside Newton Stewart in Galloway, southwest Scotland. He developed an interest in mathematics which took him first to Edinburgh University in 1954 (direct entry into the second year) where he won a Napier Medal for his final year examinations. In 1957, at the age of 21 he went to take a second undergraduate degree in mathematics, this time at Trinity College, Cambridge. He entered directly into Part II of the Tripos and became a Wrangler and subsequently went on to Part III. It was at this stage that Mirrlees developed an interest in economics, arising from discussions with fellow students. He was put in contact with Pierro Sraffa, the University Lecturer in economics at Trinity College. Mirrlees later wrote “[I]t was

indeed economics I wanted to do, because I kept discussing it with economist friends, and they didn't make sense to me; and because poverty in what were then called the underdeveloped countries, seemed to me what really mattered in the world, and that meant economics" (Nobelprize.org 1996).

His formal studies in economics began when he took the Diploma in Economics: a one year 'crash course' constituted from parts of the final year of the economics degree. His official supervisor was Richard Stone, but he also worked initially with David Champernowne and attended lectures and seminars given by the Cambridge luminaries of the day: Kahn, Kaldor and Joan Robinson. Mirrlees was pointed in the direction of Frank Ramsey's theory of optimal saving. Frank Hahn soon arrived and as Mirrlees wrote, "at some point in all this I had discovered Samuelson and mathematical economics" (ibid.). As noted, he also discovered Ramsey's theory of savings (Ramsay 1928). However, Kaldor needed a research assistant to help him out with the maths and the result was the Kaldor and Mirrlees paper 'A New Model of Economic Growth' published in the *Review of Economic Studies* in 1962. He went on to complete his Ph.D. in 1964 with the thesis title *Optimum Planning for a Dynamic Economy*, which included his subsequent article 'Optimum Growth when Technology is Changing' (Mirrlees 1967).

Mirrlees's first stint at Cambridge ended in 1969 when he moved to Oxford at the age of 33 to become the first Edgeworth Professor of Economics based at the relatively new Nuffield College where he remained until 1995. This was a period of great productivity, during which he wrote many important papers both with colleagues and Ph.D. students. He had a particularly close working relationship with Peter Diamond, with whom he

collaborated several times, as well as Sir Nick Stern, Ian Little and others. Whilst he had started supervising Ph.D. students at Cambridge – one of his first was Sir Partha Dasgupta, who graduated in 1968 – his list of doctoral students in these Oxford years is long and varied, including Sir John Vickers, Jesus Seade, Peter Neary, Jiang Wei Ying, Anthony Venables, Tim Besley, Gareth Myles and many others. He was also co-editor of *Econometrica* over the period 1980-84.

I had the pleasure and privilege myself of being Jim's Ph.D. student¹ in the years 1982-85. I had done a degree in philosophy and economics at Oxford prior to going to Nuffield and so always felt a little underprepared for working with the embodiment of mathematical rigour in economics. However, he was always genial and encouraging. He knew little of my chosen topic of Edgeworthian oligopoly models. However, he gently helped me understand how I could express and analyse my disparate and disorganised ideas in terms of a formal mathematical model. Part of this is to choose carefully the propositions or theorems you prove: they should distill the essence of what you are trying to communicate. I remember, after some discussion on a particular issue, he said "now, that is a Theorem worth proving," which meant that we had found (after a few alternatives) the exact way of expressing the key idea. Then there was the proof. Once you had a theorem to prove, the task became purely mathematical. Economic intuition might be a helpful guide, but in the end a proof is a mathematical procedure of moving symbols about. Once you had the proof, there was also the issue of "elegance": the proof was best concise and no longer than strictly necessary. Any elegance my proofs might have I owe entirely to Jim. Thirty years later, when involved in a proof, I often

¹ Or, to use the correct Oxford terminology, a D.Phil. student. Ph.D. and D.Phil. are simply alternative abbreviations of "Doctor of Philosophy."

think back to those supervision meetings I had with Jim in his college room.

In 1995, Mirrlees moved back to Cambridge, as Professor of Political Economy and Fellow of Trinity, and had the pleasure of living in College for six years (his first wife Gill had died in 1993). In 1996, he was awarded the Nobel Prize in Economics, along with William Vickery. The Nobel citation was “for their fundamental contributions to the economic theory of incentives under asymmetric information” and in Mirrlees’s case he had “Developed methods of analyzing the problems of incomplete, or asymmetrical, information. Specialized in work in optimal taxation.” Whilst his main theoretical work was over, his interests in the fields of taxation and growth in developing countries continued. Indeed, in many ways his role in the realm of practical policy was about to begin. He had been involved in advising the Pakistani government in the late 1960s whilst visiting the Pakistan Institute of Development. However, in later life he was involved with the Institute of Fiscal Studies’ (IFS) Mirrlees Commission and advising the Scottish government.

In 2001, he married again, to Patricia. Lady Patricia Mirrlees had worked in Beijing over the period 1977-87 on the magazine *Chinese Literature*, and also in Macau at the University of East Asia and so had long-standing connections with China. When James Mirrlees retired from his Cambridge chair in 2003, he took a part-time research position as ‘distinguished professor-at-large’ in the Chinese University of Hong Kong along with other time-to-time positions at the University of Macau, the University of Melbourne and Peking University. As a Nobel Laureate, he was invited to give many varied lectures in this period, covering all kinds of topics. These included how one should use labour subsidies to reduce unemployment in Spain, how GDP and inequality were likely

to grow in China, what sort of taxes there should be, the serious problems of derivatives creating moral hazard and economic crises, economic comparisons of India and China, the policy implications of non-rational behaviour, and why the Mediterranean economies should relinquish the Euro. Much but not all of the content has remained unpublished.

In 2006, when asked by Lawrence Lau, then vice-chancellor of the Chinese University of Hong Kong, to become Master of a new institution, Morningside College, in the University, Mirrlees agreed (to his own surprise), because he was a strong believer in the value of small colleges in the Oxford/Cambridge style. Morningside took its first students in 2010, and he became a full-time professor in the University. The College acquired its building in 2011, with a Master's Lodge, in which he and his wife currently live. The post is set to continue until the end of 2017. He intends to return to live in England when he eventually retires from Hong Kong.

2 Economics and the economist

Mirrlees has had a long, varied and distinguished academic career. His fields of interest have remained quite stable over time: growth, development and taxation. Whilst he was awarded the Nobel Prize primarily for his work on optimal income taxation, this was closely related to his earlier work on optimal growth. As an economist he is very much a product of Cambridge and his convictions about economics were established during his early years in Cambridge. His views about the role of the economist and economic theory written in the 1960s and in more recent years are really quite similar and show a vision and integrity which is rare amongst academic economists.

Mirrlees has a strong belief in the need for economic theory to be rigorous and grounded in sound mathematics.² His mathematical approach to economics had as its starting point the work of Frank Ramsey, which developed into his work on optimal growth and taxation. In the late 60s and 70s he was working at the frontier of mathematical economics, and was able not only to develop models but to solve them in a manner that opened up new paths to a whole generation of economists to explore. He sees the role of the economist very much as a technical advisor who provides practical solutions to the design of optimal policy. He is not a believer in the free market: for him the unfettered market will not yield the socially optimal outcome. For example, he has long seen income distribution and the need for equality as central to social welfare. Taxation is needed not only for redistribution but to fund the welfare state and the various benefits and goods it provides. The problem of optimal taxation is how to balance these aims with the distortions caused by taxes that tend to reduce welfare.

As befits the first Edgeworth Professor at Oxford, Mirrlees's view of social welfare has always been largely utilitarian. Although it has become fashionable more recently to adopt a utilitarian or 'happiness' framework, for most of his career the orthodoxy was that utility should be only ordinal and that cardinal utility in the utilitarian sense³ was neither needed nor useful. However, Mirrlees stood out against the orthodoxy and has

² For a recent statement of this view, see his lecture 'Mathematics and Real Economics' given at The Inaugural Conference @ King's, Institute for New Economic Thinking, in 2010. Available at <https://www.youtube.com/watch?v=-39znKX8kC8>.

³ As opposed to the Von Neuman-Morgenstern sense of a useful summary statistic combining preferences over lotteries.

long been an advocate of using aggregate consumption (suitably adjusted for issues such as inequality) as a reliable indicator of welfare. In a 1977 lecture entitled ‘The Economic Uses of Utilitarianism,’ he stated: “Some economists, when evaluating alternative economic policies, are utilitarians. At any rate they look at something they call the total utility of the outcome. This paper is intended to argue in favour of this procedure”.⁴

Mirrlees’ conception of utility was similar to Edgeworth’s and his contemporary and colleague Amartya Sen’s: it was a real or ‘factual’ thing rather than a subjective feeling, a person’s conception of their own well-being. The issue of measurability was one that Mirrlees believed could be overcome as was the issue of interpersonal comparisons. This was reflected in his notion of ‘isomorphism’: it is sometimes possible to treat individuals who are the same with respect to some way of comparing their experiences as ‘isomorphic.’ In this case, the outcomes of economic (or social) policies ought to be evaluated by adding their individual utilities, ‘because everyone ought to agree to have every other individual treated as one of his alternative selves’ (ibid., 83). For example, in the optimal income tax problem, you treat individuals as isomorphic with respect to their after-tax income and leisure. That Mirrlees’ view remains utilitarian is reflected in his more recent discussion of the Human Development Index. He argues that per capita consumption and not income should be used (since utility depends on consumption) and that lifetime utility would be better than simple life expectancy.⁵

⁴ Reprinted as ‘The Economic Uses of Utilitarianism,’ in Mirrlees (2006).

⁵ See Mirrlees’s contribution to ‘What is Development?’ at the Institute for New Economic Thinking’s ‘Changing of the Guard?’ conference in Hong Kong in 2013. Available at <https://www.youtube.com/watch?v=LNK65LjMcD0>.

3 Growth

Mirrlees himself plays down his role in the 1962 paper with Kaldor, 'A New Model of Economic Growth': "In the end he generously made me a co-author" (Nobelprize.org 1996). However, it stands as a milestone in his career: it became a much-cited paper which was part of standard courses on economic growth for two decades after it was written. It also put the name of 'Mirrlees' into the international limelight for the first time.

There are several economic ideas in the paper. These reflect the interests of Kaldor which were very much part of the Cambridge environment of the time. What interests us in this article is the way that Mirrlees uses his mathematics to bring these ideas to life. He developed a dynamical system of differential equations. The use of continuous time was a natural continuation of his interest in the Ramsey model. The Kaldor-Mirrlees model consists of some of the then standard Cambridge assumptions: investment comes from savings which are a constant proportion of profits, and there is a vintage model of investment which drives productivity. Mirrlees takes these and develops a mathematical system of equations: he then jumps around differentiating integrals, integrating differential equations searching for a solution to the system of equations in 'steady growth.' Existence and uniqueness are established in an Appendix. The model also includes the 'Golden Age' assumption that expectations are fulfilled. For me, one of the interesting features of the paper is section 15: Mirrlees ran numerical simulations of the model which were partly calibrated. Numerical simulation is very easy now due to software. In 1962, this would have been a much more laborious matter!

It is in fact hard to believe that this model was written in 1962. The methods used by Mirrlees would at that time have been largely unknown to all but a few economists, mostly in the US. The article itself had a distinguished life: probably due to the advanced nature of the mathematics, it was more cited than read. However, the citations died out after the neoclassical growth model became the orthodoxy in the 1970s.

The interest in development and growth continued. The issue of optimal growth in a Ramsey model with technology followed. It is illuminating to look at the opening paragraph of Mirrlees (1967: 95):

Ramsey's famous paper created the subject of optimum economic growth. The chief deficiency in the subject as he left it, despite some illuminating comments, was the unrealism of his assumptions. I do not intend to make the shallow and pointless complaint that his assumptions are not exactly right. The point is that we have not, up to the present, known how to calculate optimum policies for models that might be a useful approximation to economies we know. It must now be assumed that technological change is an important influence on growth: models that neglect it are useful for developing analytic tools, but give no guidance for applications.

One can see here that Mirrlees views technological change as important for growth (and development, an issue to which we will come). He wanted to extend the Ramsey model to include this feature and that is exactly what he did. However, it also displays his belief that there is a need to analyze models that 'approximate' real economies.

Again, for me the most interesting thing about the paper is its great care and attention to detail. The paper was at the forefront of mathematical economics. Following Ramsey, economists tend to look at infinite horizon models. For obvious reasons, the mathematics developed for physics and engineering only looks at finite-horizon models. Optimization in a finite horizon has both an initial condition and a terminal condition. These are usually enough to pick out a particular path as the optimal one. However, in infinite-horizon models the terminal condition is absent. Economics of course went on to develop the appropriate transversality condition: the condition that the value of the shadow price vector tends to zero as time tends to infinity. However, in the mid-1960s when the paper was written all this had yet to be sorted out. Mirrlees ends up with a saddlepath in his Figure 1, although he does not use the term 'saddlepath.' He rules out the 'explosive' paths on economic grounds:

Paths reaching the z -axis cannot represent the optimum development, for x becomes negative, and they therefore do not even represent feasible developments of the economy ... Similarly if one...followed a path lying below RB" [i.e. the saddlepath], "there would be a lower rate of consumption at every subsequent date, which is obviously inferior. These paths we have rejected accumulate capital unnecessarily: with their associated prices, they fulfil all the competitive conditions, but they are not efficient (ibid., 99-100).

The mathematical analysis looks at special cases (the production function is Cobb-Douglas or CES) and also looks at the solution when there are increasing returns and non-constant growth rates of the population and/or technology. The analysis is both innovative and exhaustive.

What did the young Mirrlees see as important in his work? Again, we can let him speak for himself:

Is it worth while to calculate optimum policies, and discover the features of optimum growth paths? We can, I think, make three kinds of claim for the usefulness of such a model as is discussed in this paper. First, it may be claimed that it helps us to judge the performance of actual economies; second, that it provides a method of estimating the optimum rate of investment for a government that determines the aggregate distribution of output between consumption and investment by fiscal and monetary means; third, that it provides a means of estimating accounting prices for the use of an economic administration that takes detailed economic decisions, and for its guidance in establishing a system of taxation (ibid., 123).

The worldview Mirrlees shared at the time was one of economic planning ('administration' and 'decisions') and a guide to taxation – the subject of which he was soon to move on to.

4 Triumph: optimal taxation

Mirrlees had been developing his understanding of economics and the mathematical modelling of it in the 1960s. What happened soon after his arrival at Oxford was that the problems he examined were at the epicentre of economic theory. He started to look in detail at the problem of income and commodity taxation leading to his development

of the mathematical framework which was to have a much wider application across a significant range of economic models. The way Mirrlees formulated the issue was that optimal taxation was a problem in what would later be called asymmetric information: the tax had to be designed in a world where the underlying abilities (potential earnings) of individuals could not be observed. This meant that not only was there the standard trade-off between efficiency and (non lump-sum) taxes, but also an informational problem (how to tax people when you could not observe ability). The triumph was not simply to understand this problem, but to solve it. Depending on the social welfare function (the maximand), the aim of the tax regime is partly redistributive: you want to tax higher-ability households and transfer money to lower-ability households. However, you do not know who the higher-ability households are: all you can observe is their income and infer ability.

The key to the ‘Mirrleesian’ approach is the ‘sorting’ or ‘single-crossing’ condition, which says that the optimum consumption of households is a non-decreasing function of their ability (it is stated as condition B on page 182 of Mirrlees (1971)). In his own words: “It is equivalent to assuming that (in the absence of taxation) the consumer’s demand for goods is an increasing function of the real wage rate (at any given non-wage income).” This of course is very closely related to the *Revelation principle*. Mirrlees did not think of the model as an information revelation problem, but an optimal taxation problem can be thought of equivalently as one where the household faces a tax based on its ability and has to report its ability. The design of the optimal tax will then involve the household reporting truthfully its ability. In the fields of mechanism design and imperfect information this became a key point. It is often referred to as the Mirrlees-Spence single-crossing condition: however, in Spence’s work there are only finitely

many types (two), whereas Mirrlees covered the case of ability being a ‘continuous’ variable. It was working out how to deal with this problem that proved more useful than the application of optimal income taxation within which Mirrlees developed it. As he wrote a quarter of a century later:

In the income-tax problem, relatively simple conditions, easily checked for the particular model I was using, implied that the solution of the equations did give an optimum: the conditions were sufficient as well as necessary. When the computations were done, one knew one had the right answer, not just an answer that might be right (Mirrlees 1997: 1,317).

It is interesting to see where the solution came from. Mirrlees had been dealing for some years with the Ramsey growth model: this involves choosing consumption as a function of time. In the optimal income tax problem, you have to choose consumption as a function of income. It was the genius of Mirrlees to make the link that the same Pontryagin maximum principle applied to both, although in the 1971 paper he prefers to use the calculus of variations in his derivations – as had Ramsey – because it was more intuitive and familiar. The dynamic optimization framework Mirrlees had been working with on the optimal growth problem could thus be adapted and applied to the problem of income taxation. No one had ever done this before and it provided the tools for use in a whole range of similar problems in different fields of economics over subsequent decades – in particular contract theory, the principal-agent problem and what has become known as Mechanism Design.

The work on taxation also extended to look at another of Ramsey’s interests: optimal

indirect taxation. Ramsey had derived the famous result that the tax rate on a commodity should be equal to the inverse of the elasticity: it is better to tax goods that have inelastic demands since this will lead to less welfare loss. With Peter Diamond, Mirrlees considered an extension of Ramsey's result. What happens if you have production? How should indirect taxes then be chosen? The result was the *Diamond-Mirrlees Efficiency Theorem*. In essence, the optimal indirect tax must involve productive efficiency (in the standard Pareto sense). Optimal indirect taxes cannot involve any distortion of the prices faced by producers (assuming no market imperfections such as externalities). Hence, indirect taxes should simply be on final consumption goods. Producer and intermediate goods prices should not be subject to taxation.

What does the optimal income tax schedule look like? This depends on the assumptions made about the distribution of abilities and the preferences of households. The original Mirrlees paper considered some explicit examples and many more researchers went on to explore special cases. One interesting result that seems to be fairly common is that the marginal tax rate might be declining in income towards the top end, perhaps with a zero rate for the highest income. At the bottom income levels the marginal tax rate could be low and even negative. To understand this, the special case of a degenerate distribution of types where everyone is the same can be used. Here, the incentive compatibility constraint falls away and you can tax everyone the same. Efficiency will then dictate a universal lump-sum tax with zero marginal rate. If there is a little inequality, you want to introduce a small marginal tax but keep the average tax high enough to cover the required tax revenue. For the lowest-ability workers, the lump-sum element will result in low or possibly negative consumption that may need to be

compensated with a lower, zero or possibly negative income tax. This in turn means that the marginal tax rate will be increasing as you move to the middle-income earners. The zero top rate comes about because the real wage and hence marginal productivity of the top earner is the highest, hence the disincentive effect of income taxation is the highest. The inverted U-shape is quite common: the marginal tax is highest for middle (modal)-income earners. However, it is also possible to have the marginal rate declining everywhere, or indeed and approximately a 'flat tax'.

5 Development

Prior to his move to Oxford, following the suggestion of Amartya Sen, in the late 60s Mirrlees joined the India Project run by Paul Rosenstein-Rodan for the MIT Center for International Studies, spending time at MIT (during which he met Bob Solow and Paul Samuelson) and then India. He applied his attention to the issue of development. The end result was the work with Ian Little and the 'Little-Mirrlees' method of cost-benefit analysis for developing countries. This was nothing less than a general framework applying appropriate shadow prices to public sector activities to enable efficient allocation of resources by the public sector. Distributional issues were included in choosing the shadow price of labour, as were distortions such as currency controls. Prior to Little-Mirrlees the main approach had been to employ market prices to undertake cost-benefit analysis in developing countries: whilst there are limitations to using market prices to measure opportunity cost and marginal benefits in developed countries due to distributional and market failures, in developing countries these limitations become huge and market prices can be highly misleading (see Mirrlees (1969a) and Little and Mirrlees (1969)). Again, this is an instance of Mirrlees wanting to do things

properly rather than taking the easy option. Also, we see the expert economic advisor looking beyond and behind the market to design policy that can increase welfare and promote economic efficiency. Ian Little also shared Mirrlees's utilitarian perspective (see Little 2002).

Mirrlees's interest in development has remained, more recently focusing on the issue of taxation (see Mirrlees 2011a). Mirrlees is very much aware of the problem of collecting taxation in developing countries: he believes that governments should use "all the kinds of taxes that really work in lower income countries" (ibid.). Here of course, his experiences in India were highly instructive to him: a sales tax is the most practical to raise, but was in effect an "urban" tax with little chance of being levied in rural areas. In order to make a sales tax progressive you need to add subsidies. An income tax is harder to make work: he is of the opinion that when he was in India it was "totally ineffective," although nowadays that is not true in India and China:

With the urban sector growing rapidly in many countries, only a few people paying tax should be quite a temporary phenomenon. For example, a lot of people now pay tax in People's Republic of China. There will always be many people in rural areas that you should be able to get into the tax system. But it actually becomes very inefficient including large numbers of low income tax payers as you end up only collecting a small amount of tax and it usually costs almost as much to collect the tax. So I come back to thinking that a sales tax is a pretty good way of doing it (ibid.).

6 The economist as advisor

The Mirrlees Commission, which reported in 2010, aimed to update the earlier IFS Commission on Taxation chaired by Cambridge economist James Meade three decades earlier in 1978. Not only was Mirrlees chairing it, but some of the distinguished members were also his erstwhile Ph.D. students, including Timothy Besley and Gareth Myles. The title ‘Tax by Design’ certainly reflected the Mirrleesian world view that we have met in his writings on optimal tax and growth:

Tax by Design is both an imperative and a description of our approach in this review. Our aim is to set out the principles on which a 21st century tax system should be based and then to apply them in suggesting concrete policy recommendations to improve the UK tax system. To that end, we use insights from economic theory and empirical research to discuss the impact that the tax system has on people’s behaviour, and the resulting trade-offs that policymakers have to make between the various and often conflicting objectives that they might wish the tax system to achieve (Mirrlees et al. 2011a: 1).

Mirrlees himself spoke as chairman of the committee:

The review shows that the UK system falls short of the ideal in costly and inequitable ways. It discourages saving and investment, and distorts the form they take. It favours corporate debt over equity finance. It fails to deal effectively with either greenhouse gas emissions or road congestion. The revenue it raises, and the redistribution it does, could be achieved in less costly ways. We propose both a long-term vision of a better system, and directions for reform. Some of the

recommended reforms involve tweaks to current policy; others involve radical change, and are probably for the longer term. It is undeniable that some of the proposed changes would be politically difficult. But failure to reform imposes enduring costs (Mirrlees quoted in IFS 2010: 1).

The report is over 500 pages long and includes a great deal of detail. However, the three main recommendations were:

- 1) The tax system should be designed as a whole, being both green and progressive.
- 2) The tax system should seek neutrality. Tax systems should not distort people's behaviour by treating similar activities differently without very good reason.
- 3) The tax system should achieve progressivity as efficiently as possible. That means relying on the rate schedule of personal taxes and benefits – rather than inefficiently distorting the tax base – to achieve redistribution.

We can see very much the Mirrleesian theme of the need to redistribute income resulting in progressive taxation. However, the tax system needs to be efficient and take into account the distortionary effects it creates. Also, it is necessary to look at the benefits system as a whole. Mirrlees himself is typically very modest about his role in the commission bearing his name: “I wish I had been in the UK during that period: it was difficult to get properly involved so far away in Hong Kong; but I liked what we produced” (private correspondence).

In 2007, the devolved Scottish government set up the Council of Economic Advisers (CEA) in which James Mirrlees was and still is a member. He was also a member of the

Fiscal Commission Working Group (FCWG), alongside Joseph Stiglitz and others advising on fiscal issues that would face an independent Scotland. Although he has always kept his own personal views on Scottish independence private, he made a decisive public intervention in the 2014 referendum (*The Telegraph*, 24 August, 2014). He argued that in post-independence negotiations, the Scottish government should not agree to take on its share of the British national debt unless currency union and sharing of the pound was agreed. His reasoning was that, “It is hard to see how Scotland can take on the debt unless there is a full currency union.” Earlier in 2014, he had also suggested that an independent Scotland would have to look at the “alternative of a Scottish pound” separate to sterling, with Scotland launching its own central bank and borrowing at a higher rate to protect the new Scottish pound. However, he believed that the currency would have to be pegged to the pound to prevent inflation rising sharply: “It would probably require some borrowing initially, at a rate a little higher than UK’s current borrowing rate, but initially lower than the rate of inflation, so not very expensive; and it has the advantage of somewhat greater policy flexibility in the longer run.”⁶

On the issue of currency union with England, Mirrlees argued against the Governor of the Bank of England, Mark Carney. He stated that, “My views are based on economic principles and observation of monetary unions elsewhere. They are about what is technically possible and identifying a clearly workable and preferable option.” The advantages of a currency union were

reducing transaction costs and exchange-rate risk, encouraging trade, competition

⁶ *The Scotsman*, 15 February 2014.

and economic efficiency. Surely it is better for the English to be able to use their money in Scotland without paying to change it? That is not a trivial benefit. Nor is the absence of exchange risk, which otherwise has to be added to investment risk.

He also argued that the Eurozone experience did not provide a good example for an Anglo-Scottish union. Whereas the Eurozone membership was diverse, “In contrast Scotland and the rest of the UK are very similar economies. Though there are some risks of asymmetric shocks, institutions can be built to adjust to them; and the costs are small relative to the advantages mentioned.”⁷

Earlier, in 2013, Mirrlees presented evidence on the Scottish government’s *Revenue Scotland and Tax Powers Bill*. In his discussion,

Efficiency is a concept that, for economists at least, means something more precise and restrictive than it did for Adam Smith. As a (joint-)author of an ‘efficiency theorem’ in tax theory, I am strongly attached to this property, but it is a property of the whole production of the economy, as influenced by the tax system as a whole. A main requirement is that there should not be taxes on transactions between producers, except to counter externalities such as atmospheric pollution and congestion (Mirrlees 2013: 2).

7 Conclusion

In this brief chapter I have focused on what are for me the main themes of Jim

⁷ *The Scotsman*, 13 February 2015.

Mirrlees's career as an economist. This can be summarised as the application of mathematics to the design of economic policy (taxation in particular), for the betterment of society in the utilitarian tradition. In his early career he was working at the forefront of mathematical economics, at first developing the work of Frank Ramsey. However, his moment of genius was to adapt the same mathematical techniques to the issue of optimal taxation and his formulation of the single-crossing condition. His framework was to provide the springboard for decades of research by many economists, in many fields but particularly in public economics. It was for this that he was awarded the Nobel Prize.

However, there are several avenues of his research I have not been able to cover. Within his list of publications are some real treasures. My personal favourite is his 'The Optimum Town,' written in 1972 (Mirrlees 1972): starting from first principles, he sets up the location problem and works through the conditions to derive an elegant set of results. Another is his 1976 article, 'The Optimal Structure of Incentives and Authority Within an Organization.' Articles such as these embody the same elegance and scope as his work on taxation.

Mirrlees always viewed his work as trying to solve a problem that was of practical relevance to the economy and society. From his utilitarian perspective he was always concerned with issues of equity, although this had to be achieved in a manner consistent with efficiency. His ideas have affected policy design for decades. In his later career he was also able to have a more direct policy role, an economist as advisor. He was also a prolific supervisor of Ph.D. students and has a real commitment to the highest values of higher education, as reflected in his role in the setting up of Morningside College.

References

Main and cited works by James Mirrlees:

Diamond, P.A. and J.A. Mirrlees (1971). 'Optimal Taxation and Public Production I: Production Efficiency'. *American Economic Review*, 61(1): 8-27.

Diamond, P.A. and J.A. Mirrlees (1971). 'Optimal Taxation and Public Production II: Tax Rules'. *American Economic Review*, 61(3): 261-78.

Diamond, P.A. and Mirrlees, J.A. (1973). 'Aggregate Production with Consumption Externalities'. *Quarterly Journal of Economics*, 87(1): 1-24.

Diamond, P.A. and J.A. Mirrlees (1975). 'On the Assignment of Liability: The Uniform Case'. *Bell Journal of Economics*, 6(2): 487-516.

Diamond, P.A. and J.A. Mirrlees (1976). 'Private Constant Returns and Public Shadow Prices'. *Review of Economic Studies*, 43(1): 41-47.

Diamond, P.A. and J.A. Mirrlees (1978). 'A Model of Social Insurance with Variable Retirement'. *Journal of Public Economics*, 10(3): 295-336.

Diamond, P.A. and J.A. Mirrlees (1986). 'Payroll-Tax Financed Social Insurance with Variable Retirement'. *Scandinavian Journal of Economics*, 88(1): 25-50.

Diamond, P.A., L.J. Helms and J.A. Mirrlees (1980). 'Optimal Taxation in a Stochastic Economy : A Cobb-Douglas Example'. *Journal of Public Economics*, 14(1): 1-29.

Dixit, A., J.A. Mirrlees and N.H. Stern (1975). 'Optimum Saving with Economies of Scale'. *Review of Economic Studies*, 42(3): 303-25.

Kaldor, N. and J.A. Mirrlees (1962). 'A New Model of Economic Growth. *Review of Economic Studies*, 29(3): 174-92.

- Little, I.M.D. and J.A. Mirrlees (1969). *Manual of Industrial Project Analysis in Developing Countries*. Volume II of *Social Cost Benefit Analysis*. Paris: OECD.
- Little, I.M.D. and J.A. Mirrlees (1972). 'A Reply to Some Criticisms of the OECD Manual'. *Oxford Bulletin of Economics and Statistics*, 34(1): 153-68.
- Little, I.M.D. and J.A. Mirrlees (1974). *Project Selection and Planning for Developing Countries*. London: Heinemann.
- Mirrlees, J.A. (1967). 'Optimum Growth when Technology is Changing'. *Review of Economic Studies*, 34(1): 95-124.
- Mirrlees, J.A. (1969a). 'The Evaluation of National Income in an Imperfect Economy'. *Pakistan Development Review*, 9(1): 1-13.
- Mirrlees, J.A. (1969). 'The Dynamic Nonsubstitution Theorem'. *Review of Economic Studies*, 36(105): 67-76.
- Mirrlees, J.A. (1971). 'An Exploration in the Theory of Optimum Income Taxation'. *Review of Economic Studies*, 38(114): 175-208.
- Mirrlees, J.A. (1972). 'On Producer Taxation'. *Review of Economic Studies*, 39(1): 105-11.
- Mirrlees, J.A. (1972). 'The Optimum Town'. *Swedish Journal of Economics*, 74(1): 114-135.
- Mirrlees, J.A. (1972). 'Population Policy and the Taxation of Family Size'. *Journal of Public Economics*, 1(2): 169-98.
- Mirrlees, J.A. (1976). 'Optimal Tax Theory: A Synthesis'. *Journal of Public Economics*, 6(4): 327-58.
- Mirrlees, J.A. (1976). 'The Optimal Structure of Incentives and Authority Within an Organization'. *Bell Journal of Economics*, 7(1): 105-31.
- Mirrlees, J.A. (1978). 'Social Benefit-Cost Analysis and the Distribution of Income'.

World Development, 6(2): 131-38.

Mirrlees, J.A. (1982). 'Migration and Optimal Income Taxes'. *Journal of Public Economics*, 18(3): 319-41.

Mirrlees, J.A. (1990). 'Taxing Uncertain Incomes'. *Oxford Economic Papers*, 42(1): 34-45.

Mirrlees, J.A. (1995). 'Welfare Economics and Economies Of Scale'. *Japanese Economic Review*, 46(1): 38-62.

Mirrlees, J.A. (1995). 'Private Risk and Public Action: The Economics of the Welfare State'. *European Economic Review*, 39(3-4): 383-97.

Mirrlees, J.A. (1997). 'Information and Incentives: The Economics of Carrots and Sticks'. *Economic Journal*, 107(444): 1,311-129.

Mirrlees, J.A. (1999). 'The Theory of Moral Hazard and Unobservable Behaviour: Part I'. *Review of Economic Studies*, 66(1): 3-21.

Mirrlees, J.A. (2001). 'Les impôts. Pourquoi? Combien?'. *Revue Française d'Économie*, 15(4): 3-18.

Mirrlees, J.A. (2006). *Welfare, Incentives, and Taxation*. Oxford: Oxford University Press.

Mirrlees, J.A. (2011a). 'Professor Sir James Mirrlees on Poverty and Redistribution'. Asian Development Bank. Available at <http://www.adb.org/features/professor-sir-james-mirrlees-poverty-and-redistribution>.

Mirrlees, J.A. (2011). 'ADB Distinguished Speakers Program: Poverty and Redistribution in Emerging Economies'. *Asian Development Review*, 28(2): 1-10.

Mirrlees, J.A. (2012). 'Évaluer les Politiques de Développement: Evaluating Development Policies'. *Revue d'Économie du Développement*, 20(4): 11-25.

Mirrlees, J.A. (2013). 'Finance Committee Call for Evidence – *Revenue Scotland and*

Tax Powers Bill: Submission from Professor Sir James Mirrlees'. Available at http://www.scottish.parliament.uk/S4_FinanceCommittee/PROFESSOR_SIR_JAMES_MIRLEES_TP.pdf

Mirrlees, J.A., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2011a). *Tax by Design*. Oxford: Oxford University Press.

Mirrlees, J.A., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2011). 'The Mirrlees Review: Conclusions and Recommendations for Reform'. *Fiscal Studies*, 32(3): 331-59.

Mirrlees, J.A., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2012). 'The Mirrlees Review: A Proposal For Systematic Tax Reform'. *National Tax Journal*, 65(3): 655-83.

Mirrlees, J.A. and R. Raimondo (2013). 'Strategies in the Principal-Agent Model'. *Economic Theory*, 53(3): 605-56.

Mirrlees, J.A. and N.H. Stern (1972). 'Fairly Good Plans'. *Journal of Economic Theory*, 4(2): 268-88.

Neary, J.P., J.A. Mirrlees and J. Tirole (2003). 'Evaluating Economics Research in Europe: An Introduction'. *Journal of the European Economic Association*, 1(6): 1,239-249.

Other cited works:

IFS (2010). 'Mirrlees Review of Tax System Recommends Radical Changes'. Press Release, 10 November.

Little, I.M.D. (2002). *Ethics, Economics, and Politics: Principles of Public Policy*.

Oxford: Oxford University Press.

Nobelprize.org (1996). 'James A. Mirrlees – Biographical'. Available at http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1996/mirrlees-bio.html

Ramsey F.P. (1928). 'A Mathematical Theory of Saving'. *Economic Journal*, 38(152): 543-59.