



Tapan Mitra: Mathematical Economist and Economic Theorist

On this, his 12th (posthumous) publication in the *Journal of Mathematical Economics*, his 150th publication so far, the Editors, Andrés Carvajal and Raouf Boucekine, have graciously given me an opportunity to celebrate Tapan Mitra's achievements as a theorist of the first rank (in so far as sterling scholarship can be ranked), and on the legacy that he leaves to all those who follow him in working on his chosen subjects. I am honored to track some of the lion's footprints, and confine myself only to publications of his last two decades, a baker's dozen plus one.¹ These self-imposed constraints, deferring both to considerations of space and to the author's evident limitations, grate at two levels: why these two decades? why these fourteen papers? I bracket these questions.

Tapan Mitra's chosen subject was the efficiency and equity of inter-temporal allocation of renewable and non-renewable resources in a mold set out by Ramsey, von Neumann, Samuelson, Koopmans, Solow and Malinvaud, and in a tone and style reminiscent of Hicks, Allais, Meade, Morishima and Johansen. There is a certain single-mindedness, a unity and an un-distracted focus, in an *oeuvre* whose full impact remains yet to be fully realized, and shall take time. It is a *corpus* that traverses several lines: takes established theoretical principles to shed light on a range of economic issues (applied economics, or in the jargon now current, applied theory), and extends canonical models in recasting their foundations (pure theory or economic principles); hankers after generality with the same determination that it brings its consummate craftsmanship to bear on explicit functional forms; as much at ease with discrete time and finite techniques as in continuous time and a continuum of techniques. Mitra wrote on forestry,² on the extinction of resources [13], on principles of project evaluation [3], on choice of technique in development planning [7], on commons [14], on climate change [12], all on one hand; and on non-convexities and the Phelps–Koopmans theorem [9], on Cantor sets and iterated functional systems [4], on turbulence and chaotic dynamics [1],³ on the other. It is a body of work whose longevity surely lies in isolating conditionalities that are necessary *and* sufficient: buffered by decisive counterexamples,

an illustration of how a butterfly can be pinned in a way that does justice to the butterfly and the craftsman doing the pinning.

In a letter to Arthur Bowley, Marshall notoriously opined that the use of mathematics “by a man who is not a mathematician by nature – and I have come across a good deal of that – seems to me an unmixed evil. [Y]ou should do all you can to prevent people from using Mathematics in cases in which the English language is as short as the Mathematical”. Indeed, as is well-known, he went further, and advised the use of mathematics as a “shorthand language, rather than as an engine of inquiry”, to be translated into the language of the everyday, and to be burnt if it cannot be “illustrate[d] by examples that are important in real life”.⁴ In its modern version, this attitude is expressed as an editorial imperative that insists on a simple example, the more arithmetical the better, to capture the essential “big” idea, and that generalizations be relegated to appendices and supplementary material, to be hidden from the popular mainstream view.

To be sure, Mitra's theorems (a random selection) can be translated into the language of the everyday: soil erosion and climate change, or a sudden crash in productivity, (drought, pestilence), population overshoot, or a decline in harvesting costs can tip an unmanaged common into ruin [14]; in the long run, [Ramsey's conjecture holds so that] society is divided into the set of patient households who own the entire capital stock and impatient ones without any physical wealth [10]; relative merits of forms of utilitarianism [8]; Suppes–Sen maximality leads to a violation of the Pigou–Dalton transfer principle [11]; a non-convergent path with limiting capital stocks above (and bounded away from) the smallest golden rule can be efficient, even if the model admits a unique golden rule [9]; a full-employment no-excess capacity Stiglitz' program can be *bad*, leave alone non-optimal [7]. But certainly there are theorems that cannot be so translated at all, [1, 2, 5, 6, 13].⁵ If one were to burn the models and the mathematics, the argumentation that underlies these everyday claims, surely much, not only economics but also mathematics of value, would be burnt away. Put more constructively, one can challenge readers of our time, leave alone those

¹ For prior work, the subject that he came to, and a complete list of publications, see K. Basu, M. K. Majumdar and K. Nishimura 2010, “Economics according to Tapan Mitra: An introduction”, *International Journal of Economic Theory* **6** (2010) 1–10; M. J. Farrell's 1973 introduction to *Readings in Welfare Economics*, Macmillan; and <http://econ.nyu.edu/user/debraj/TapanMitra/Publications.html>.

² See the author's celebration of the Mitra–Wan and Samuelson papers on the Faustmann problem in “On a forest as a commodity and on commodification in the discipline of forestry”, *Forest Policy and Economics* **72** (2016), 7–17.

³ Also see “On Mitra's sufficient condition for topological chaos: Seventeen years later”, *Economics Letters*, (L. Deng and the author), **164** (2018), pp. 70–74.

⁴ See Robert W. Dimand, 2007, “Keynes, IS-LM, and the Marshallian Tradition”, *History of Political Economy* **39**, 81–95.

⁵ My self-imposed constraint prevents me from citing his 1991 ET paper with Cass based on his SUNY Working paper 198; and arguably his most remarkable theorem on a universal constant, of a purely qualitative model, a number-theoretic result that inspires the piece following this tribute. His efforts towards its publication with the (independently-proved) Nishimura–Yano theorem is a marvelous testimony to the highest professional values that generous scholarship can rise to.

of Marshall's, or Friedman's and Stigler's, time,⁶ pre-eminent Marshallians both, to work out for themselves in the language of the everyday all that leads to these conclusions. The fact that this is a fool's errand is as much a consequence of Mitra's signature as it is a testimony to the progress of the discipline: his work can be read as a synecdoche of the ascent of inter-temporal economic theory from 1976, the date of his Rochester dissertation, to 2019.

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⁶ See "Textual and Scientific Exegesis: George Stigler and Method in Economic Science", (E. E. Schlee and the author), Chapter 18 in Craig Freedman (ed.) *George Stigler*. London: Palgrave.

The House Was Quiet And The World Was Calm



Wallace Stevens

The house was quiet and the world was calm.
The reader became the book; and summer night

Was like the conscious being of the book.
The house was quiet and the world was calm.

The words were spoken as if there was no book,
Except that the reader leaned above the page,

Wanted to lean, wanted much to be
The scholar to whom his book is true, to whom

The summer night is like a perfection of thought.
The house was quiet because it had to be.

The quiet was part of the meaning, part of the mind:
The access of perfection to the page.

And the world was calm. The truth in a calm world,
In which there is no other meaning, itself

Is calm, itself is summer and night, itself
Is the reader leaning late and reading there.

Wallace Stevens is one of America's most respected poets. He was a master stylist, employing an extraordinary vocabulary and a rigorous precision in crafting his poems. But he was also a philosopher of aesthetics, vigorously exploring the notion of poetry as the supreme fusion of the creative imagination and objective reality. Because of the extreme technical and thematic complexity of his work, Stevens was sometimes considered a willfully difficult poet. But he was also acknowledged as an eminent abstractionist and a provocative thinker, and that reputation has continued since his death. Noted literary critic Harold Bloom, whose writings on Stevens include the imposing *Wallace Stevens: The Poems of Our Climate*, called him "the best and most representative American poet of our time."

The above poem has a spiritual poise. Here is a wonderful discussion and analysis on this poem by Edward Hirsch

"Stevens's poem is so fulfilling because it enacts the texture and feeling of the experience of reading late into the night. It is not a report but a dramatic realization in the form of a meditative lyric, a poem that moves on the wings of eight stately two-line stanzas. At one moment, for example, the words seem to come to the fictive reader unmediated by the printed letters on the page, by the actual physical object of the book itself ("the words were spoken as if there was no book"), and he merges with his chosen text ("the reader became the book"). At another moment, however, he feels himself distanced and hovering over the very same book ("the reader leaned above the page"). Reading is re-created here as a physical activity as well as a mental action. An act of attention. A quest. The fulfillment of a desire.

"The house was quiet and the world was calm" is a poem of spiritual attainment that locates and focuses the transaction between the reader, the book, the house, the night, and the world. The poem establishes a correspondence between the inner realm of the house and the outer one of the cosmos. It's as if the quietness of the dwelling rhymes with the calmness of the universe on a summer night. The proposition is twofold: the house was quiet and the world was calm. Daily life, the daylight world itself, is suppressed. The poem takes place at night in order to establish a scene of autonomous solitude. No one else seems to be stirring nearby. The world sleeps, and the reader is alone with his book. So, too, this must be a summer night because summer is the season of plenitude and fulfillment. The reader in Stevens's poem is a poetic quester, a pilgrim in search of a vivid transparency. He wants to transform himself into "the scholar to whom his book is true." That desire in turn leads to an even greater one, since this scholar wants to be the one "to whom / The summer night is like

a perfection of thought.” He seeks an utter realization of mind and, indeed, the phrase “a perfection of thought” puts one in the range, in the unlimited mental space—the cosmos—of the divine.

So, too, the unnamed book that the reader studies becomes the emblem of his spiritual meditation. It’s as if through the contemplative act—the act of the mind in the process of finding what will suffice—the scholar and the book merge with the night in order to become the form of its true substantiation. The silence itself—of the house, of the mind—makes possible “the access of perfection to the page.” There is a kind of poetic crossing here. Reading itself becomes a mystic activity as the poem enacts its own ultimately satisfying transport to summer.

“The House Was Quiet and the World Was Calm” gives us access through a third-person center of consciousness to a reader’s mind in a state of complete receptivity. It moves into a part of the mind that often seems unavailable to us, that is not antagonized. It dramatizes and re-creates that consciousness and thus provides us with the deepest form of mental nourishment. This is a poem of the spirit because it triggers a vital principle within the poem, which is part of its meaning. One might even speculate that the poem itself is only fully realized when the reader of Wallace Stevens’s poem becomes exactly like the reader within his poem, finding an access to wholeness or perfection, leaning late and reading there.”