A Preliminary History of Economics at MIT, 1940-1972

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Comments are welcome.

Introduction[1]

The financial and economic crisis beginning with the collapse of American banking institutions in 2007 prompted a general reassessment of the state of the art of a science which, it was said, had failed both to predict economic troubles or to propose the appropriate cures. In the wake of Krugman 2009, numerous opinion columns resurrected the traditional "freshwater vs saltwater" characterization of the discipline, a distinction economists had thought buried. While the first group is clearly identified with the much studied Chicago School, the origins, characteristics and contours of the second one are less analytically and historically identifiable. Some referred to it as "Cambridge" (Stiglitz 2001), a label encompassing sometimes Yale (Solow 2005), often Harvard (Klamer 1984, 49), and always the Massachusetts Institute of Technology (Klamer 1984, 50; Colander 1998, 5; Mirowski 2008).[2]

As MIT is celebrating its 150th birthday, testimonies and recollections are pouring in. They emphasize the central role of Nobel Prizes awarded to Paul Samuelson, Robert Solow, Franco

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[2] The distinction is often tripartite, but there is no agreement on the identity of the third player. Stiglitz 2001, for instance, remarked that "there were three High Churches in the economics profession: Chicago on the right and Cambridge, U.K. on the left, with MIT being in the center," while Hands and Mirowski 1998 have spread among historians the representation that the postwar economic academia was divided between Chicago, MIT and Cowles. In his *New York Times* column, Krugman also added Berkeley to the saltwater group.

Modigliani, Robert Merton and Peter Diamond, their distinctive style, the quality of thesis supervision and of a curriculum in which participated, as students or instructors, other Nobel laureates such as Lawrence Klein, Robert Mundell, Robert Engle, Eric Maskin, George Akerlof, Joseph Stiglitz and Paul Krugman, public institution leaders including Stanley Fisher, current director of the Federal Reserve Bank Ben Bernanke and current and recent directors of the Council of Economic Advisors Austan Golsbee and Christina Romer, among others. This commentary also pointed out MIT's excellence in many research areas like growth theory, macroeconomics, public economics, finance, development economics, urban, energy and environmental economics.[3] Yet, it is difficult to discern how these overlapping generations of economists working in a variety of areas and resorting to a multiplicity of techniques interconnect with one another to form "MIT." Nor have historians written the history of MIT economics. Only Mirowski 2006, who includes Harvard under the label "MIT school" and Mehrling (2005, 192-5), who identifies MIT with "the neokeynesian troika," have provided even a sketchy characterization of these communities as a background for their histories of price theory and the financial revolution.

In contrast, what follows tells the story of how a small service department within a technically oriented engineering school of the Boston area in the nineteen thirties has become one of the leading economics departments in the world. The narrative provides a panorama of the MIT protagonists and the institutions in which they evolved. Within the Institute, economics was being done not only at the department of economics, but also at the Center for International Studies (herafter CIS), the business school, and even in a host of science and engineering departments.[4] The history of the Chicago school has long suffered from being conducted in terms of "Friedman (mister macro)+ Stigler (mister micro)" until recent research focused not only the department of economics, but also the Business School (Nik Khah 2011) and the Law School (Medema 2011), and highlighted the diversity of generations, players, and beliefs (See Van Horn, Mirowski and Stapleford 2011) . This speaks in favor of a broad perspective of the comparably important MIT community. This research on Chicago has also emphasized that this school did not emerge spontaneously but was a result of a deliberate strategy, underpinned by a quest for lasting funding and by the establishment of institutional structures aimed at developing and spreading their creed, such as the workshop system (Emmett 2011). This emphasis on the role of institutional structures is also apparent in recent work on creative communities such as Quesnay's workshop, the Vienna Circle, the

[3] See the interviews of Samuelson, Solow, Diamond, Lester Thurow, Lawrence Becow the MIT +150 infinite history project (http://mit150.mit.edu/infinite-history) and the videos of the sessions on "Economics and Finance: From Theory to Practice to Policy" (http://mit150.mit.edu/symposia/economics).

[4] Throughout this paper, we will use the term MIT to refer to the community of scholars doing economics, and the term Institute as a shortcut for "Massachusetts Institute of Technology," understood as the institution.

Bloomsbury Group, and the Virginia School(Forget and Goodwin 2011). All this suggests that a study of the institutional structures which shaped the interactions of the first generation of MIT economists and which they subsequently attempted to alter is essential to understanding their intellectual development.

This narrative tells of the rise of a department of economics. Yet, the departmental structure, Fourcade (2009) says, is the specific feature of the American educational system which underpinned the professionalization of economists: she tells us that the diploma delivered by the top economics departments of the country were the blueprint which gave a new set of professionals labelled "economists" their credibility, expertise and legitimacy, and enabled them to sell themselves to other educating bodies, government institutions or firms.[5] Taking up Fourcade 's observation (2009, 40) of the dual role of the university department "as a teaching unit and as the main site for the production of academic research," this paper makes the claim that the development of economics at MIT cannot be understood without devoting close attention to the educational project it embodied. Indeed, in all the testimonies and reminiscences available, the quality of education is as much praised as the excellence of research. MIT was universally perceived as an unusually "student-oriented" department (Fisher 2004; Shiller 2006, 654; Shell 2001, 708; Krugman 1995; Merton 2007). This, we argue, is reflective of a self-conscious educational vision whose main architects were Samuelson and especially Solow, and whose purpose was to spread a new way of doing economics throughout the profession. At MIT, the establishment of a community of researchers went hand in hand with the development of a graduate and undergraduate curriculum, one that influenced the recruitment process and the emergence of new areas of expertise.

In section 1, we explain how the recruitment of Samuelson in 1940 fostered the establishment of a small community of economists within an engineering school which was itself undergoing major transformations, and how the war opened the door to the development of humanities and social sciences at MIT, to psychology and political sciences as much as to economics.[6] Section 2 describes how a "new economics" was shaped during the fifties, one still influenced by the demands of engineers, scientists and business students, and somewhat eclipsed by the promising interdisciplinary research programs emerging in the newly founded Center for International Studies. In Section 3 we show how, in the context of increased awareness of the professionalization of the

[5] By contrast, she demonstrates, British economists derived their expertise from their membership to an intellectual elite and the French researchers from the structure of civil service such as the "corps d'état."

[6] The information on recruitment at the MIT department of economics and social sciences between 1933 and 1970 is taken from "Economic Department Academic Staff, 1933-165 and 1969-1971," AC394.

discipline, MIT economists instantiated the vision of Samuelson and Solow and worked to make their graduate program the most appealing of the country and gained wide public visibility as policy-oriented scientists. In section 4 we detail how, beginning in the mid sixties, MIT's apparently flourishing community was internally and externally challenged, and how the reforms implemented in reaction to these challenges led to a normalization/ standardization of its programs.

1940-1950: Establishment

Economics for scientists, engineers and managers

In contast to older traditional economic departments such as Chicago or Harvard, it was not until the thirties that a "department of economics and social sciences" was created at MIT. Founded in 1861 by geologist William Barton Rogers and funded by a land grant, the Institute was intended as a "polytechnic school of the useful arts." It then evolved as an engineering school servicing industry (Kaiser 2010). In 1932, President Karl Compton and his provost Vannevar Bush initiated the Institute's transformation into a science-based university.[7] They reformed the university structure by creating three distinct Schools (science, engineering and architecture) and two divisions (Humanities, and Industrial cooperation and research), introduced a heavy dose of fundamental sciences into the undergraduate curriculum, and added several renowned faculty to the departments of Physics and Biology in order to foster the science-based technological research they believed would interest foundations such as the Rockefeller and government agencies such as the Tennessee Valley Authority. The Institute's activities were still much technically oriented and heavily dependent upon industrial sponsorship. Compton and Bush were nevertheless looking for arrangements which would make them independent, and they introduced greater control over consulting and patents, whose property and management was entrusted to the Institute's Research Corporation. By the late thirties, the Institute hosted around 2500 undergraduate and 400 graduate students, and was operating on a research budget of $335,000 with 1/8 granted by federal organizations and the remainder by industries. Among the major industrial patrons of these years was Alfred Sloan, who lavishly funded an educational program in business and engineering to train future managers and engineers. Following Sloan, and the Institute executives' feeling that "the engineer of the future will be vitally concerned with relations between labor and management" (PR 1940, 89), an industrial relations section was established within the department of economics and social science in 1937. Its purpose was to perform research on hiring policies, collective bargaining,

[7] This picture of MIT in the thirties draws upon Lecuyer 1992.

etc. (PR 1939, 135-137).[8]

At that time, the department's main function was to provide support teaching for other departments, on quality control or statistics for instance. However its head, Ralph Freeman, was eager to advance Compton's vision of a science-oriented leading university. Together with Rupert McLaurin, a Harvard business school PhD whose fundraising acumen had just got him a huge grant from the Rockefeller for the study of technological changes, and several other industrial fellowships, he began hunting for promising recruits (Samuelson 2007; Brown and Solow 1983). Paul Pigors and Charles Myers were brought in to staff the Rockefeller project, and in September 1940, assistant professor and statistician Harold Freeman, who was attending courses at nearby Harvard university, advised them to lure away a brilliant young Harvard PhD who has just accepted a one year position as instructor in the Department of economics

Paul Samuelson greatly enjoyed the intellectual atmosphere he had found at Harvard three years earlier when transferring from Chicago: Alvin Hansen's exposure of Keynesian principles, Schumpeter's vision of capitalism and business cycles, Leontief's input-output analysis and Edwin B. Wilson's advocacy of the application of the mathematics used in physics to social science, one the young student had taken at his word in his dissertation.[9] Yet, whether because of his brashness, or Harvard's pervasive antisemitism, or Economics department head Burbank's utter contempt for the nascent mathematical economics he was advancing, Samuelson did not felt welcome at the illustrious university. McLaurin's offer was financially attractive, the three mile move down the Charles River would not entail a change in his geographical or intellectual community, and although MIT was "tech as hell" in those days, he knew he would find a research atmosphere and student state of mind congenial to his attempt to transform the language in which economists were thinking. Samuelson helped set a graduate program in industrial economics in 1941, one that attracted Lawrence Klein (PhD 1944).When the faculty scattered among governmental institutions to participated into war work, the program was however discontinued. But when the returning veterans began to crowd the Institute corridors in 1944, the seed for a rise of economics and the humanities at MIT were already sowed.

Bringing humanities into the curriculum

[8] The material borrowed from the Reports to the Presidents published by MIT from 1871 on and archived online at http://libraries.mit.edu/archives/mithistory/presidents-reports.html , are referred to as PR+date of issue.

[9] This account of Samuelon's Harvard year of his move to MIT is based on Samuelson in (Brown and Solow 1983) and (Samuelson 2007) (*add the other reference*s).

Building on the transformations they had initiated in the thirties, Compton and Bush had succeeded in attracting crucial war projects such as the microwave research Radiation Laboratory (where Samuelson had worked during the war), the building of x-ray apparatus, fire control systems and the firing set of the atomic bomb. As a result, the MIT research budget had soared by 1944 to $40 million, an overwhelming share coming from federal funds (48 to 1 with industry). With the pewrceived rise of the communist threat in the late forties, military sponsorship took over war funding (Lecuyer 1992). The number of undergraduate students likewise rose to 4000 by the end of the decade and, as a consequence of the transformation of the Institute into a major research university, the number of graduate student boomed (PR 1949). The curricula were gradually altered to meet the changes in numbers and interests of the students. The Humanities was integrated into the undergraduate curriculum in 1944. Students could take two introductory courses in economics during their junior year, then specialize in psychology, labor relations or industrial economics. A "course XIV" was also established in 1946. It allowed science and engineering students to pursue an economics or international relations major together with their scientific studies. It was the only program in which students could take up to 50% of their courses in non-scientific or non-engineering disciplines. In 1947, the graduate program in industrial economic reopened. And in 1949, when 50 students were doing graduate work in the department, the business school opened an "advanced studies program for executives." With these various program, and introductory economics made compulsory by most engineering departments, the number of science and engineering undergraduates enrolled in economics courses reached XX by 1950 (including 60 in course XIV. PR 1949, 149).

Several economists were recruited to meet the increased teaching needs: MIT PhD Robert Bishop became assistant professor, fiscal specialist Cary Brown (PhD Berkeley 1937) transferred from the division of tax research of the US Treasury in 1947, international economist Charles Kindleberger (PhD Columbia 1937) arrived in 1948 after helping to frame the Marshall Plan, and they were joined by the industrial economist Morris Adelman (PhD Harvard 1948). In 1950, Harvard PhD Robert Solow was hired to meet the increasing need for teaching in statistics both at the undergraduate and graduate levels. Although the bulk of research was still conducted by the industrial section in the late forties, the reputation of MIT economics was strengthened by Samuelson's prestige inside and outside the Institute. The 1947 release of *The Foundation of Economic Analysis,* based on his dissertation, was immediately recognized as a watershed (see Baumol 1949 and Allen 1949) and his numerous papers on revealed preference, welfare economics,

etc. earned him the John Bates Clark Medal the same year. The prize, together with Samuelson's reception of a Guggenheim fellowship in 1948 and the creation of the course XIV, were the sole events related to economics about which the student weekly newspaper *The Tech* reported in these years. With the hope to make the introduction of undergraduate engineers and scientists to economics less unpopular, department chair Ralph Freeman asked Samuelson to write a textbook. *Economics* was released in 1948. It sold more than 120,000 copies and was adopted by more than 50 university in its first year (Skousen 1997; PR 1948, 150). Even though the book was thought to bequite technical by the economic profession at that time (ref?), Samuelson considered that he had rather refrained from bringing in the mathematical apparatus MIT students would have felt comfortable with, only using mathematics as a tool to make economics relevant (see Samuelson 2007). *Economics* was the vehicle whereby MIT first became associated with a peculiar method –in Solow's words domesticated mathematics,-- and content - the exposition of Keynesian theory and the attempt at a "neoclassical synthesis."

The recognition of humanities at MIT was complete by 1949 when the conclusions of the committee on Educational Survey, chaired by chemical engineer Warren K. Lewis, were issued. The committee urged that more humanities be introduced into the science and engineering curriculum (80% science and 20% humanities was to be the rule) and advised that the humanities section be established as the fourth Institute school. They also asked MIT social scientists to present an "integrated" body of knowledge to students, thereby praising interdisciplinary work. Freshmen and sophomores would take a common humanities core, and juniors would then choose between three social sciences sequences: one in economics, comprising the two introductory courses that most engineering departments had already made compulsory, and a set of electives to be chosen between National Income, Economics of Patents and Inventions, Public Finance, or Banking and Finance. It was the first consistent sequence in economics that MIT undergraduates were presented with. They could alternatively choose an "industrial relation" sequence which included psychology and labor relations courses, or specialize in International Relations. The curriculum also reflected both the growing demand for training and the enhanced visibility of psychology triggered by the war. Kurt Lewin had transferred from Harvard in 1946 to participate in the newly created Tavistok Institute and soon created a "Research Center for Group Dynamics" (PR 1945, 142), and an associated PhD program. Attracting students such as Leon Festinger, its main areas of research were industry, community life, minority problems and relations between economics and culture (PR 1946, 149). After Lewin's sudden death, Alex Bavelas founded a laboratory in communication theory in 1949. To meet the requirements of the new curriculum, the economics department also recruited its first

specialist in international relations, Norman J. Padleford.

1951-1958: Expansion

The Center for International Studies, flagship of the development of social sciences at MIT

The expansion of economics at MIT during the fifties was driven by the transformation of the Institute's institutional structure and interests. After the recruitment of Joseph C.R. Licklider, a psychologist specialized in information technology and psychoacoustics, and of cognitive psychologist George A. Miller, psychology became an independent section within the department in 1952. Also of great impact on the composition of the department faculty was the creation of the Center for International Studies in 1952. Two years earlier, in the middle of the Korea war and the USSR Nuclear tests, the State department had assembled at MIT an interdisciplinary team of scientists to make the Voice of America radio a technical and political tool to help America fight the Soviet propaganda (Needell 1993). The Ford Foundation then offered the Institute a $1,000,000 grant to turn this "Project Troy" into a permanent interdisciplinary institute aimed a dealing with "the problems of policy and action arising out of the international position of the United-States" (PR 53,83). Max Millikan, a former CIA member recruited in 1950 by the department of economics, was appointed chairman. The center had indeed close (yet undisclosed) ties with the CIA and defense department for whom it would run classified projects, for instance on the Soviet Union. As a research body attached to the School of Humanities, the Center had neither faculty nor an educational project of its own, with the consequence that its members had to be hired by a MIT department and work with their faculty to create courses within existing curricula. The students' rising concern with international relations entailed the success of its dedicated undergraduate sequence. Research programs on Soviet studies and international communication were immediately launched. Walt Rostow moved from the MIT department of history to direct the former program, and Ithiel de Sola Pool (PhD Chicago 1952), a communication specialist who had studied the effect of Nazi and communist propaganda during the war, was hired in 1954 to build the latter. With the addition of sociologist Daniel Lerner, political science gained enough momentum to become an independent section in 1956. A third CIS program dealt with the economic development of several countries deemed vulnerable to communism, and this spurred the recruitment of several economists in 1953 with the status of "visiting professors." Paul Rosenstein-Rodan from the International Bank for Reconstruction and Development, was to work on Italy, while Wilfred Malenbaum from the Department of State would concentrate on India. , Everett Hagen, formerly at the university of

Illinois and senior economic advisor to the Government of Burma was hired to focus on Indonesia, assisted by Benjamin Higgins from McGill University. These additions were seen as an opportunity to orient the curriculum toward the preparation of engineers for foreign service. Also, under the influence of CIS economists, development economics became a doctoral field in 1955. Thanks to the continuous and generous funding of its projects – in 1955, the Ford Foundation awarded $75,000 for general purpose against $15,000 for the faculty, $212,500 for Indian studies, against $4,250 to Brown and $18,500 for Samuelson for research projects. In 1957, Ford granted another $150,000 for development studies – the CIS embodied the promises of the development of social sciences for MIT leaders, one they imagined interdisciplinary.[10]

Meanwhile, the industrial relation (IR) section, enlarged by the promotion of graduate student George P. Shultz to assistant professor in 1952 and the recruitment of John Coleman, was in the process of becoming a joint structure of the department of economics and the business school. Thanks to a $5,000 000 grant from Alfred Sloan, the latter became the School of Industrial Management, fifth School of the Institute, in 1952, and founded a new graduate program. The business school officials had endorsed the same vision as Carnegie Tech's, in which management techniques were to become more scientific if underpinned by economic concepts. Accordingly, the school turned to economists to upgrade its curriculum. By 1954, one third of the theses written by Sloan fellows were supervised by economists from the IR section (PR 1954), and most economists (Solow, Freeman and Adelman among others) were teaching business students new quantitative techniques such as statistics and operation research.[11] As repeatedly emphasized in Reports of the President, "much of the research of the Department bears directly on the interests of the School - research on the economics of particular technologies; on the problems of measurement of productivity and output; on the contribution of technical progress to economic growth; on the origin and growth of new enterprises." When the business school moved to the newly acquired Sloan building at the far end of the campus at the beginning of 1953, the department of economics left the Hayden library, where humanities was located, and followed management scientists, a sign of their close relationships.

A community built through the development of the curriculum

[10] Histories of the Center for Advanced Studies can be found in Blackmer 2002, Gilman 2003. On the administrative status of the CIS within the Institute, see PR 1969.

[11] On the diverging intellectual path taken by business schools in the postwar era, see Fourcade and Kuhrana 2009 and Nik-Khak 2001.

Back in the fifties, the group of economists MIT is nowadays associated with, Solow and Samuelson, but also Kindleberger and Evsey Domar(recruited in 1958 to teach comparative economic system and soviet economics), was thus a sort of leftover. Yet, although a minority, the neoclassical economists had a vision for the department. "We view ourselves as net exporters of finished economists," Solow wrote Domar, then at John Hopkins, in 1956. Indeed, they viewed the economics curriculum as the means to spread the "new economics" they were fashioning at that time. The explicit aim of the graduate school was to train future elite teachers. 20 to 25 students were allowed to enroll each year; there were 67 students in residence in 1956. Some had come to MIT with the purpose of studying mathematics (Diamond 2007) or physics, and switched after a semester. Most were attracted by the reputation of Samuelson and were won over by the excellence of the teaching, the availability of the faculty, the unity of a group which met everyday for lunch to discuss economic issues, and their talents for thesis supervision. In the mid fifties, Solow was supervising, among others, John Karenken on policy making process in a trade union, then on monetary theory, Ronald Jones on international trade theory, Louis Lefeber at the CIS on external economies and transportation, and Alain Enthoven at Rand. Samuelson was advising his student Dick Kruizenga to take into account brownian movement in his theoretical and institutional study of the put and call market.Robert Mundell was working on international trade under the supervision of Kindleberger. Solow and Kindleberg represented the two main pillars underpinning the development of the graduate school. The two first students' choice for thesis supervision, Solow would supervised close to 70 students (between 1954 and 1997), including 10 in the late fifties, and Kindleberger would train around 50 graduates until 1980, including 15 in the fifties. By comparison, Samuelson supervised 23 dissertations between 1948 and 1978, including 8 in the fifties.

The training of undergraduates was not neglected. Although Samuelson was not much personally involved, the careful revision of his *Economics* textbook every other year or so enabled him to ascertain as well as anticipate and eventually influence the evolution of economists' *status quo*. His widely used textbook was thus a major tool to define, safeguard and spread economics' *mainstream* (see for instance Skousen 1997, 139). The two elementary economics courses, relabeled 14.01 and 14.02, closely followed the chapters of his textbook, and were supplemented by a readings book he assembled with the help of Bishop and Coleman in ??. Also, the attacks against its keynesian content by McCarthyites conferred a special identity upon the economics taught at MIT. The general orientation of the undergraduate program was to introduce the student to macroeconomics first. Course 14.01 covered notions of scarcity, supply and demand, but the bulk of

it was devoted to national income accounting, income determination, unemployment, monetary theory and economic growth. Course 14.02 then focused on consumer theory, the theory of firms, equilibria, capital theory and micro policies. A core sequence was gradually shaped, which included intermediate courses, "Price and Production" (03) and "Economic Fluctuations and Growth" (05), a course in elementary statistics and one in the Structure of the American economy. The other subjects were determined by the interests of the then small number of faculty interested in undergraduate teaching. For instance, Kindleberger proposed a course in international trade, Brown in public finance and Domar in comparative economic systems. Complying with humanities requirements, some 800 students took economics courses at MIT, but no one actually *majored* in economics. There was no specific economic major, and the audience for course XIV, with its half science or engineering sequence and half economic studies, was floundering. After the end of quotas [?]in 1949, enrollment dramatically fell from 84 registered in 1949 to 27 in 1952-53, only to improve slightly afterwards. The quality of students was poor, and the program was perceived by MIT students as "designed for those students that are so frustrated by Newton, Faraday and Co. that they can't even cope with Course XV, or for reluctant engineers that really should be in the ivory towers up the river." (The Tech, January 17 1947). In 1958, a committee chaired by Brown, assisted by Harold Freeman and new recruits Francis Bator, former MIT graduate and assistant of Millikan, and expert in labor relations Abraham Siegel, was appointed to upgrade the quality and quantity of course XIV students. After a close analysis of the professional employment of MIT's former engineering and science undergraduates, they concluded that the visibility of the program would be improved if the electives chosen were to be grouped in three fields. "General economics" would comprise Money and Banking, Public Finance, International Trade, Comparative Economic Systems, Labor Economics and Public Policy, Corporate Finance, Growth of the American Industrial Economy, and Technology and Economic Growth. The "industrial and labor economics program" would rather appeal to the future industry policy maker, broker, an economist in the research department of a trade union or body such as A.D. Little, or an industrial economist at the State department, the World Bank, etc. Such a person would study Industrial organization and public policy, economics of invention, financial management, accounting; labor relations, collective bargaining and union management, plus some industry courses such as transportation economics, construction and land economics, etc. The third option, "quantitative economics", would focus on the acquisition of technical skills: it would include courses in econometrics, statistical theory, information theory, computation, and programming and decision theory (OR) courses such as sequential analysis, quality control, theory of games, etc.[12]

[12] "Course XIV Undergraduate Economic Program," undated report (probably 1958 or 1959), PR 1958 and 1959.

Forging "new economics"

The main organizers of the "quantitative economics" sequence, Samuelson and Solow, thus drew on the specificities of their audience, their mathematical background and "their ability to move into more advanced things more quickly" (Diamond 2007), to bring their most recent research into the curriculum. Sponsored by RAND, their work on linear programming collected its applications to transportation, firms, Leontief systems, efficient capital accumulation paths, general equilibrium and welfare economics was published in a book with Harvard economist Robert Dorfman in 1958. They were indeed working in close connection with Harvard circles. Samuelson taught one joint course on monopolies with Chamberlin, and to convince Hendrik Houthakker to visit MIT, Solow argued that "we have plenty of contact with the Harvard people, like Orcutt, Duesenberry, Dorfman, etc.. Bishop and Adelman were also collaborating with Harvard economists to map out studies of monopoly, bigness and appropriate changes in antitrust laws. Generally, the various groups of economists who were together within the department concentrated on similar subjects at that time. The pressing issue was that of growth, and their placement in an engineering school and their tradition in industrial economics gave them some command of technical progress and production process issues. In addition to Hagen and his team, Rostow was working on a systematic description of the successive stages of growth and the conditions for economic take-off (productive investment, development of manufacturing sectors, free trade, leading to high mass consumption). His modernization theory was published in 1960 under the title *The Stages of Economics Growth: A non-Communist Manifesto.* Meanwhile, Samuelson and Solow were applying the kind of mathematical dynamic models expounded in *Foundations* to the study of the general conditions for growth. In the 1930s Samuelson had already published papers which investigated the functioning of an ideal capital market and the behavior of the interest rate in, and he had applied linear programming to dynamic models in a 1949 RAND memo. In 1956, Solow added a time varying technology variable to capital and labor exhibiting constant returns to scale and identified a steady state defined solely by capital accumulation and a convergence path depending on population growth and technical progress. He statistically estimated this total factor productivity the following year (Solow 1957). The furthering of their analysis of efficient paths of capital accumulation in their book with Dorfman resulted in the first turnpike theorem. MIT'sdistinctive style of doing economics, based on modeling microeconomic behavior as maximization under constraints and macroeconomic behavior as the interaction of aggregate demand and aggregate supply, its attention to imperfect competition, its use of the definition of dynamics as comparative

statics and the use of mathematical yet simple models aimed at understanding a few aspects of a situation rather was applied to a wide range of economic issues: trade (Samuelson 1948), welfare economics, consumer behavior (Samuelson 1938), capital theory, and public expenditure (Samuelson 1954). These models were taught to the growing number of MIT graduate students who in turn taught them to students at other universities, and were also spread through Solow and Samuelson's editorial responsibilities at *Econometrica (look for Samuelson's editorship in journals).*[13]

1959-1966: Emancipation and Success

A student oriented department

By the beginning of the sixties, the professionalization of economics shaped the department's strategies. "The main element in the process of professionalization of American economics was the redefinition of the PhD, an *academic* credential providing evidence of specialized *scholarly* competence, as the primary mechanism for certifying expertise in both scientific and practical matters" as pointed out by Fourcade (2009, 72). The consequence was that, at the same time the MIT graduate program gained prestige, competition among economic departments grew steadily. MIT economists envisioned recruitment as the mean to remain at the cutting edge of economic research, as attested by the arguments put forth during the recruitment of Franklin Fisher, a Harvard student in mathematical economics working on "a priori information and time series analysis" who had just accepted a position at the University of Chicago. Solow underlined that "Fisher could be compared only with Griliches of Chicago, Jorgenson of Berkeley, and Nerlove of Stanford in his age group. I think I would add Ned Phelps of Yale...These are the stars of the 30-35 age group in American economics....With so many departments expanding all around the country, and only this small pool of first-class people to bid for, it's no surprise that prices get bid up fast." The same considerations prevailed during the recruitment of Diamond:

[13] Solow to Houthakker, 01/21/57, folder H1, Box 55, SPDU. On Samuelson's new economics, see (Feiwel 1982' Weintraub 1991; McCloskey 2002; Mirowski 1989; Samuelson in Barnett 2004). Characterizations of the MIT style can be found in (Merhling 2005, 192-5 and Mirowski 2006). In spite of the diverging interests and methods of these various groups of MIT economists and social scientists, there did not seem to be any fight for control, recruitment, or curriculum issues similar to those seen at the Harvard Social Relations department in the forties between the followers of Parsons and those of Sorokin (see Johnston 1998 for a detailed account). As later attested by Millikan (Report, 02/18/194, AC394) and Samuelson 2007, the reason for this peaceful cohabitation might be found in the constant stream of position openings and the growth in the number of students in the fifties and sixties, which enabled every group of social scientists to hire its own specialists and create its own undergraduate courses and graduate programs.

> "To maintain our position in the pecking order [of economics departments], we simply must nab one or two of the top young economists in each succeeding generation; and among those, the economic theorists are the most important.....Any connoisseur will tell your that there are only four young mathematical economic theorists under the age of 30 worth talking about in the world. Diamond is one; McFadden of Berkeley, Mirrleess of Cambridge, and Weizsacker of Heidelberg are the others. If I could, I'd want to hire them all.

While Diamond was perceived as the leader of the next generation of MIT theorists, Fisher was the architect of the development of econometrics at MIT, with the help of Edwin Kuh (PhD Harvard 1955), who had been on a joint appointment with the business school since 1959.[14] Fisher set up an econometrics course available to both undergraduates and graduates, and taught mathematical economics and advanced economic theory to graduates. His teaching assignment reflected the characteristics of the MIT curriculum in those years. The faculty was increasingly involved in undergraduate education: beside those traditionally concerned, Solow, Domar and Kindleberger, the department welcomed a stream of young economists willing to improve its course offerings: Robert Eckaus, a former CIS student (PhD 1954) and specialist of India, proposed courses in development economics; Albert Ando (PhD Carnegie 1959) taught macroeconomics, and 1964 recruit Stephen Marglin (PhD Harvard 1963) and Karl Shell (PhD Stanford 1965), continued the tradition of MIT economic theory through popular lectures as well as through theoretical work. Course XIV consequently achieved more recognition. From the low point of 35 in 1960-61, enrollment reached 78 in 1964-65. The success of the graduate school was even greater, with hundreds of applications every year (300 in 1964). The faculty's educational strategy was paying off. The department was not only renowned as Samuelson's *"home"* anymore. Virtually every former MIT student insisted on mentioning the open door policy, the quality of teaching, the lack of hierarchy, the unity of the faculty who was discussing economics everyday over lunch together, the limited number of graduate students who were encouraged to collaborate with each other, the sophisticated placement system and the hundreds of recommendation letters written by Solow is more significant (see for instance Shell 2001, 708 or Shiller 2006 among others). "This is a small department, which had decided not to get any bigger," Solow explained in 1963. The number of faculty had only risen from 22 to 25 between 1959 and 1964. As in the fifties, only 25 to 30 students were selected to enroll in the graduate program, bringing the total number of graduate students to a hundred around

[14] For the 1967 Christmas party of the department of economics, Temin and Foley parodied the Arthurian legend of the Round Table in a script to be played by students, where Arthur-Frank Fisher tried to set a new elite department of economics which would preserve theory, and Lancelot-Diamond represented the young knight who, it was hoped, would "rescue theorems from rape and pillage at the brutal hands of Midwestern PhDs" ("Shawmut Follies" (1967), AC394).

1965 (*number at Chicago and Harvard in the 60s?*). The moderate size of the graduate program allowed Solow and his colleagues to give "tender loving care to graduate students." Duncan Foley, recruited in 1966 after a PhD on General Equilibrium at Yale , reflected that, if he was allowed to bring general equilibrium into the curriculum in spite of the theoretical reservations of most MIT economists, it was because "they were so student oriented and interested in making sure that people would come through the department with what they needed to play leading role in the discipline" (Foley 2004, 191-92). And Edwin Burmeister remembered that the teaching load at MIT was so heavy that several economists left for Harvard or Yale where salaries were higher for smaller teaching duties. In addition, Solow recalled, "we had sort of evolved the principle that you did not buy off your time with research funds. If you were a member of the faculty of the MIT economics department, you taught." Economic theory, micro and macro, was perceived as the strong point of the program, but there was no permanent responsibility of the kind Friedman and Becker held at Chicago on the introductory price theory course.[15] "Mathematical approach to economics" was the only course Samuelson had been teaching on a regular basis since 1954. "Theory of income and unemployment" was taught by Domar in 1964, and by Stiglitz and Bishop the following year. Economics analysis and advanced theory were alternatively taught by Shell, Fisher, Samuelson and Solow. Monetary Economics was the realm of Modigliani, whom the faculty had contemplated hiring since 1957 and who finally joined the business school in 1962, but Samuelson sometimes replaced him. Industrial economics, Adelman's traditional area of expertise, was also taught by Paul MacAvoy or Fisher. Dominant themes were seen in thesis subjects. In particular, the sixties were the golden age of growth theory (Stiglitz 2001), as exemplified by the thesis of Peter Diamond (PhD 1963) and David Levhari (1964), both under the supervision of Solow. That the intermediate macro course was labelled "Economic Fluctuations and Growth" (*to be compared with ??? at Chicago*) is also telling. Reflecting on what made the success of MIT, Diamond (2007, 562) insisted on the focus on students as the key element:

> "You get good students in part if you have a significant value added and that is related not just to the quality of the faculty as individual researchers, individual thesis supervisors, or individual lecturers, but to

[15] "Memorandum to Committee on curricula," Student report on the graduate curriculum, 03/27/1966, 05/02/1965 "Changes for Fall 1965," "Changes for Spring 1966," AC 394. Solow to Bishop, 10/26/65, Box 52, folder B4. Solow to Brown, 05/16/66, Box 52, Folder B4. Solow to Patterson, 01/18/63, box53, Folder B7; Solow to Fisher, 04/06/67, box 55. Solow 2007. On the role of the graduate introductory Price Theory course in the making of a distinct Chicago intellectual tradition, see Hammond (1999).The situation was different with technical courses: Fisher, Shell, Kuh and Harold Freeman had been in charge of the mathematics-statistics-econometrics courses during all the sixties. Also, the graduate program offered a range of field courses which could be taught only by one faculty member. Between 1960 and 1965, Brown taught fiscal economics, Eckaus taught development economics, Domar was in charge of Soviet studies, Kindleberger of international economics. The titles and content of these courses was revised every year.

> the extent to which you have a program that works as a program in educating and looking after students. We have a tradition that goes back to the 1950s, of this being a department where the faculty work together to make it a successful program. In part this comes out of the realization that we need to work collectively to get the good program that gets us the students that we really want to be teaching. People do the heavy lifting for the things that make the program function as a program. That kind of institutional culture is something that was here when I was a student"

The
recrues of the early sixties also largely contributed to the thesis supervision: Frank Fisher trained 43 students in his career (1962-1993), 23 of whom wrote their thesis in the sixties and early seventies. When he left MIT in 1973, Kuh had supervised a total of 15 students, and between 1964 and 1970 only, Ando directed around 10 students.

Economics becomes an independent department

A second element at work in the professionalization of social sciences was the specialization of knowledge, embodied in the American departmental structure. In 1960, the MIT department of economics and social science, with its economist-neighbors psychologists and political scientists, was an exception. However interdisciplinary work was, with a few exceptions, restricted to the CIS. In other collaborations, such as a book edited by Daniel Lerner on the human meaning of social sciences in 1959 with contributions by Samuelson, Shils, …, or Solow's work with psychologist Karl Deutsch on the spread of language, the economist's role often was to provide the mathematical formalization, as in Solow's case. It is revealing that, when Samuelson was asked, in a 2007 interview, whether there was interdisciplinary collaboration at MIT, he only mentions joint work with mathematicians and physicists. Psychology became an independent department in 1964, and was endowed with its own building, appropriately located midway between the Sloan Building and those which housed other disciplines such as biology, linguistics and communication sciences (PR 1963). Neither were political scientists housed close to economists at that time. Their growth in numbers led to the opening of a graduate program and independent department in 1965.[16] As side effect of this fragmentation, the ties between the department of economics and the CIS waned. The situation of the CIS permanent visiting professors thus had be regularized: in 1960 Hagen and

[16] Interestingly, the 1963 PR mentions that « the Political Science Section is at present at a considerable physical distance from the Economics Section, but this will change upon completion of the recently authorized new structure behind the Sloan Building. This contemplated move reflects in part the fact that the Economics and Political Science Sections have a closer relationship (largely through their common connection with the Center for International Studies) than either has with the Psychology Section. » On the importance of campus geography in the development of universities research, see the introduction of Fourcade 2009 on Berkeley.

Rosenstein Rodan became full professors, but Higgins and Malenbaum left and were not replaced. The department requirement that a thesis be written onsite was not suitable given the long and frequent journeys of CIS's graduate students to India, Indonesia or Europe, and administrative and financial problems for thesis validation became more and more frequent. Also, the CIS's interests in national security, military affairs, and communist studies drew them closer to political scientists than to economists, who did not share their recent interest in agriculture in underdeveloped countries or Latin American development problems. As pointed out by Millikan in a 1964 report, "the research interests of the faculty have its center of gravity nearer the domestic than to international economic problems."[17]

A distinctive style on the public scene

To some extent, Millikan's characterization was correct. The sixties were the golden age of neoKeynesian macroeconomics at MIT. Samuelson and Solow had published their famous estimation of the Phillips curve in 1960. Solow actively looked for empirical evidence contradicting Milton Friedman's theory of lags in government reaction with the help of his student John Kareken, and Modigliani and Ando (1965) challenged Friedman and Chicago graduate student David Meiselman's 1963 testing of the relative stability of the velocity of money and of the Keynesian multiplier. But the sixties were also the moment where MIT economists' influence on the policy making process became visible. Such policy orientation was not new. From the forties onward, the reports to the president exhibited long lists of "outside activities": Brown consulted for the United States Department of the Treasury (1951) and the committee for economic development (1954), Samuelson provided advice to the United States Department of the Treasury and the Bureau of the Budget, Adelman was a member of the Attorney General's committee, and Shultz served as specialist on labor economics on the staff of the President's Council of Economic Advisers in 1956. The scale of this involvement with the policy process changed when Samuelson became John Kennedy's advisor during the 1960 presidential campaign and when Solow subsequently joined the Council of Economic Advisors at the request of Walter Heller and Jim Tobin in 1962.[18] From that moment on, MIT economists engaged more in public debates, while insisting on remaining experts devoid of political intentions at the same time. Solow formed closed friendship with Columbia sociologist Daniel Bell, who founded *The Public Interest* with Irving Kristol in 1965. His relationships with the Jewish NewYork intelligentsia enabled him to play a important role in the

[17] Report from Millikan, 02/18/194, AC394.

[18] There, he worked on the establishment of formal wage and prices 'guideposts' to prevent inflation and tax cuts to stimulate demand.

editorial line of that journal regarding economic questions. In the same vein, Samuelson agreed to be the voice of "new economics" in a weekly column for *Newsweek* in 1966, alternately with Friedman and Henry Wallich, who represented the free enterprise and center viewpoints respectively.[19] This focus on policy was an essential characteristic of the MIT style its economists were developing. If Diamond was meant for MIT, Solow claimed, it was because of "his interest in certain applied problems, especially public finance and fiscal policy...and I think he will contribute to the atmosphere of rigor-with-policy relevance that we have been trying to maintain."[20]

This quote also shows that, during the sixties, MIT economists increasingly became aware of their distinctive identity. When Fisher was courted by Harvard in 1966, Solow wrote him that the faculty needed him "to keep the special MIT flavor alive in theory and econometrics." This self-awareness largely derived from interactions -and confrontations – with other intellectual communities. They were neoclassical, but for Chicago monetarists, they were primarily a bunch of neoKeynesians, who held the functioning of markets as flawed, not only regarding macroeconomic policies but also industrial and antitrust policies. As confrontations became more numerous in academic journals, newspapers, radio and TV, Solow joked that Friedman could suspect "an organized MIT vendetta" from the "MIT Mafia." They were Keynesians, but for their overseas Cambridge colleagues, they had betrayed both Keynes's theoretical insights and methods. For in the sixties, it was Cambridge, rather than Harvard, that was MIT's *doppelgänger* and rival.[21] Spending some time in Oxford had been a tradition for MIT faculty and students since Samuelson's visit in 1949. Brown spent a year at Cambridge in 1957, Solow in 1962, Fisher and Stiglitz, then graduate students, in 1965, and Diamond in the summer of 1967. In turn, MIT welcomed Frank Hahn in 1956-57, and Amartya Sen and Joan Robinson in 1961. These visits and the significant correspondence on technical progress, the aggregation of capital inputs in production functions, the shape of production functions, the possibility of production technique reswitching, and the associated label war raging between Kaldor, Robinson, Harry Johnson, Hahn, (not all of whom agreed with each other) Samuelson and Solow, helped MIT faculty and students to understand that in this developing controversy, they represented a *collective* theoretical and methodological stance.

[19] When Samuelson stopped writing his column, *Newsweek* editor replaced him with Lester Thurow, a MIT colleague from the business school

[20] Solow to Brown (aforementionned). On the Monetarist-neoKeynesian struggle, see Hammond 1996.

[21] Contacts with Harvard had however not disappeared. MIT faculty were used to sending several students to attend Koopmans's seminar (Solow to Koopmans, 02/13/61, Box 51, folder K1), and a joint seminar on mathematical economics was to open in 1968 (Mehrling 2005, 123). As regards development economics, Millikan noted in 1965 that "Working conditions are pretty good and with Chenery and Hirschman now at Harvard there is an interesting community of specialists in the Cambridge area, a joint colloquium, and plenty of enthusiasm" (Millikan to Wherle,11/10/65, Box 61).

Already in 1953, Solow identified himself with the "neoclassical stinking fish," Robinson was chasing. And as the controversy was closing, he wrote Sen that:

> "I'm afraid I got a little annoyed in Cambridge last year by the indiscriminate use of "[K]eynesian" as an adjective meaning "mine" and "neoclassical" to mean "yours." To the extent that "neoclassical" describes the belief that a capitalistic economy tends automatically to full employment, I am not neoclassical and neither is James Meade. To the extent that "neoclassical" means a belief that you need a plausible microeconomics that allows for some kind of near optimizing behavior under whatever market conditions prevail, then it is not in the slightest incompatible with being [K]eynesian(10/26/64, Box 60 folder S7)."

It was also in a paper responding to Robinson on the surrogate production function that Samuelson used the "MIT school" label for the first time (ref 1963??).[22]

Expansion beyond departmental boundaries

In these year of public exposure and growing self-awareness, research was not solely conducted at the department. As relationships with the CIS weakened, the relationships with the business school flourished, so much so that boundaries between the two institutions gradually faded. The geographical proximity had created a common identity. "It doesn't really matter much whether he works through the Economic Department or the School; we're in the same building," Solow wrote a prospective student in 1963. In 1960, Howard Johnson, newly appointed president of the business school, announced his intention to "seek their [the economics department's] concurrence for every economics appointment made by the school." Besides Kuh, Abraham Siegel, a labor economists at the department since 1958, also became a joint appointment faculty in 1964.[23] It was finally at the business school that Modigliani was recruited (see Johnson 1999, 94). The department's economists found the intellectual atmosphere at the Sloan congenial: "our school of industrial management represents a rather different tradition from the Harvard Business School, more technically oriented, more concerned with training people skilled in analytical methods than in training businessmen", Solow wrote, emphasizing "quantitative approaches in the theory of the firm" and the "heavy dose of course work in economics" which students would find in the Masters degree of the business school. Indeed, in the mid sixties, 25% of the business graduate students were former undergraduate economics majors, and a large number were supervised by economics department faculty. Above all, it was common research interests which drew the department and the business school together. Samuelson shared with Sloan researchers a deep interest in commodity trading, and the idea of

[22] Solow to Sen, 10/26/64, Box 60, Folder S7.On the substantial literature on the Cambridge Capital Controversy, see the bibliography in Mata 2004

[23] He became dean of the business school between 1981 and 1987. He was succeeded by Lester Thurow (PhD Havard 1964), also recruited at the department in 1968. Many other MIT students and faculty got positions in business schools: Paul McAvoy...(*affiliations, and expand list*)

using brownian movement to model stock price variation brooked large in their community at that time. Paul Cootner, a former MIT PhD (1953) had returned to the business school in 1959 to teach finance. In 1964, he compiled the work of his colleagues including Sid Alexander, Eckaus, Houthakker (then visiting professor) and Kuh on subject of random walks in a book. The following year, Samuelson (1965) published an article in which he formalized the idea that random walks characterize the behavior of an ideal financial market where anticipations are perfect (the martingale).[24]

By 1965, the MIT graduate school had made its way to the top of US economics department rankings ,sharing first place with Harvard. It was the first choice of students earning a Woodrow Wilson or National Science Foundation fellowship, the two main sources for grants sponsoring graduate studies in those years. No less than Georges Akerlof, William Nordhaus, Robert Hall, Marty Weitzman, Robert Gordon, Eytan Sheshinski, Joseph Stiglitz (PhDs 66-67) Jagdish Bhagwati (PhD 67), were doing graduate work there, all but two with Solow. That year, the label "industrial" was dropped from the title of the graduate course, and most important, the undergraduate courses XIV eventually became an economic major.

1966-1972: Challenges and Reformation

From synthesis to disciplinary fragmentation

The decision to make course XIV an economics major entailed a steady rise in enrollments. The number of students who were willing to study economics within a curriculum hitherto designed for scientists and engineers doubled in two years, reaching around 150 in 1969. At the same time, the number of undergraduates taking economics courses as part of their scientific or humanities curriculum was around 1200, after a peak of 1450 in 1967. That economics majors shared most courses with humanities non majors was seen as an impediment to further deepening and improvement the former. A committee chaired by Duncan Foley therefore advised that intermediate courses 14.03 and 14.05 be split into separate sequences for courses XIV and non major students. Economics majors were to take "Macroeconomic theory" and "Microeconomic theory," taught by Foley, Sidrauski and Solow, as a prerequisite for other junior and senior XIV electives, spanning

[24] Solow to Don Roper 09/19/62; Solow to H.L. Ryan 11/26/62; Solow to Vernon Ruttan 04/15/63, Box 59, Folder R1. On the ties between the department and the business school, see also PR 1954(pp), PR 1961(p13). On the history of finance at MIT, see Poitras 2006, Jovanovic 2008, Mehrling 2005, Bernstein (1992, ch. 6), Fox 2009, ch. 4.

Industrial Organization, Monetary and Banking Policy, Public Finance, and International Trade and the research seminar. Another version of these courses, more "policy oriented" according to the report, was offered as terminal courses for humanities students only. Other applied subjects remained open to them: industrial organization and public policy, comparative economic systems, economics of the soviet union, economic growth and development, industrial relations and statistics.

Apparently, the graduate school was flourishing. MIT succeeded in luring some of its best graduate students into faculty positions: besides Diamond, Peter Temin and Bhagwati (PhDs 64 and 67 both with Kindleberger) were recruited in 1967. Bob Hall was director of graduate studies in the early seventies, and environmental economist Weitzman returned from Yale in 1972. A stream of young economists supplemented them: Harvard labor economist Michael Piore, Miguel Sidrauski, who had worked on the effects of money on long run growth at Chicago, Northwestern Africanist John Harris, Cambridge development economist Pranab K. Bardhan all arrived immediately after completing their PhD in 1967. The same year, Columbia urban economist Jerome Rothenberg accepted a joint appointment with the department of city and regional planning. Polymath Lester Thurow (PhD 1964 Harvard) and young Cornell econometrician Robert Engle arrived at MIT in 1969. This rapidly brought the faculty to 30 members in 1972. They were teaching a hundred graduate students, among whom were Avinash Dixit (PhD 1968), and Stanley Fisher (PhD 1969), who like fellow graduate Robert Merton (PhD 1969) was working on lifetime portfolio choice (Merhling 2005). Fellow graduates also included Richard Schmalensee and Robert Shiller (PhD 1970 and 1972, both with Modigliani). These graduate students were attracted by the strong theoretical sequence offered in macroeconomics and microeconomics, a cutting edge combination of subjects taught by the old guard as well as the recent additions to the department. From 1970 to 1972, students first took the microeconomics sequence comprised of "Theory of price and Resources Allocation" (Foley), "theory of the market" including monopolies and oligopolies (Bishop), "theory of producer/ consumer" (Hall), "Welfare and capital theory" (Samuelson), "Linear economic models" including linear programming, and turnpike theorems (Solow), "General Equilibrium" (Fisher), "Advanced market theory" (Bishop), "Mathematical Approach to Economic theory" (Samuelson),plus in 1972 "Economics of uncertainty" (Diamond). Then they followed a macroeconomics sequence which included "Static macroeconomics/ Keynes" (Domar or Hall), "Macroeconomic general equilibirum/ financial markets/ investment/ disequilibrium/ Intertemporal Equilibirum" (Foley), "Dynamics and stab-differential equations; inflation and Philips curves" (Solow), "Empirical macro : econometrics models of the US" (Hall or Solow), "Monetary

Economics" (Modigliani or Foley), "Fiscal Economics" (Diamond). The econometrics sequence had also been redesigned in 1968, with the creation of separate graduate and undergraduate courses, with Fisher teaching theoretical econometrics and Kuh introducing students to applied econometrics with the help of the TROLL (Time Share Reactive Online Laboratory) software he was developing. [25]

Yet from the mid-sixties on, MIT economists experienced a period of self doubt, beginning with the lost battle to recruit Kenneth Arrow. His decision to go to Harvard, in 1966, was a huge blow for the faculty. Solow, Fisher, Domar, Brown exchanged incredulous letters.[26] Harvard further tried to tempt away Fisher and Carl von Weizäcker, a promising German mathematical economist who had been spending every spring term at MIT. At a moment when the termination of the Woodrow Wilson fellowship was announced, doubts on the financial attractiveness of the Institute were on everyone's mind. In the 1967 Report to the President, Brown complained about "aggressive response by other institutions in the financial support offered to graduate students and in the retention and expansion of faculty," and more than forty years later, Solow vividly remembers that he "was pissed off when Harvard, which has lots of money, would then try to pick off the people from our faculty. And offer them more money than we could afford. And-- and this bugged the hell out of me --a lower teaching load than our people did. You got a call, you don't even have to move. You're in the same community. And here's this great university that is willing to pay you more than you're getting now to do less teaching. And it's very tempting." In the same move, some economists expressed concerns over MIT's ability to keep up with new theoretical developments. The neoclassical synthesis was increasingly shattered (see Blanchard 2008). The continuous attacks against Friedman and monetarism, Samuelson and Solow's questioning of the natural rate of unemployment hypothesis and dismissal of adaptative expectations, Peter Temin's critical examination of the *Monetary History,* did not curb the spread of monetarist ideas in a context of stagflation, and the emerging theory of rational expectations was an even greater threat to come. The macro forecasting model developed by Modigliani in association with Ando (then at Penn) and

[25] "Committee on the Undergrdaute Economic Program. Final Report with Recommendations," 1968 or 1969. "Subcommittee on Graduate subjects of instruction," Brown to Williams, 02/01/1968. "Economics Graduate Students," Eckaus, 01/29/1968, "Memorandum fro Franklin Fisher," 01/24/1968; "Committee on Curricula," Brown to Randlett, 02/01/1968. "A proposal for Reorganizing the Graduate Program," Hall, 01/01/1971; "The graduate program in Economics, 1972-1973," AC394.

[26] Interestingly, Arrow justified his choice by explaining that "there are two basic reasons for my final decision. One has to do with my perhaps somewhat dilettantish intellectual interests. I like to be close to historians, political scientists and sociologists as well as economists, and apart from strictly professional interests, I have always enjoyed close association with people in the humanities. Doubtless these interests will detract from my work as an economist but I like them and need them." (Arrow to Solow, 03/30/68, box 52 folder A1**).** This was a clear sign that, in spite of twenty years of cohabitation with psychologists and political scientists, MIT economists were not perceived as uninterested by interdisciplinary work.

the FED between 1967 and 1973, aimed at bringing together the work of several MIT economists (Brown and Ando's study of countercyclical fiscal policy, Karenken and Solow's analysis of lags, etc. *Expand),* was a semi-failure. From Israel, Fisher wrote Solow :

> "one view of our department (expressed in an extreme and biased way) is as follows. You and Paul are heavily committed ideologically to the neo-classical synthesis (whatever that is). As a result, we are unable to recognize good unorthodox work and future development in economics (and especially theory) will largely come from outside MIT"

Solow's response to Fisher emphasized the promises of those economists in the young age group: "Peter Diamond and Peter Temin will help a lot. Miguel Sidrauski may develop very well...the department has agreed to go for another econometrician if we can find a young star... I think the prospects are good that we can remain the Duffy Tavern's of economics, where the elite meet to eat." Indeed, even as the dream of building a neoclassical synthesis was encountering serious difficulty, these young economists found that the "Bob Solow view of doing economics" (Foley 200?) and the "toy models" developed by Samuelson in the previous decades were suitable for the development of a range of subfields. A thriving area was public economics. After Samuelson's pathbreaking 1954 article on public expenditures, Brown had kept the interest alive at MIT. When Diamond, whose interest in optimal taxation was aroused by teaching an undergraduate course in that field at Berkeley (Diamond 2007), came back to the Institute, he and Brown set a graduate sequence together. The next summer, Diamond began to work on optimal income taxation with James Mirleess during a summer stay at Cambridge, and by the end of 1967 they had written their article on the aggregate efficiency theorem. With Samuelson developing the pure theory of public goods, Foley and Sidrauski interested in fiscal and monetary policy, Thurow analyzing poverty, crime, manpower, and Piore studying the links between manpower, training and the labor market, by the late sixties MIT was hosting a substantial group of public economists. In order to assess the impact of monetary and fiscal policies on growth, several of them were trying to integrate money into consumption functions with the help of overlapping generation models. Diamond had taken up Samuelson's consumption-loan model of 1958 to extend the growth model, and the idea was further extended to multi-assets accumulation by Shell, Stiglitz and Sidrauski (1970). Thanks to the effort of Jerome Rothenberg, urban economics also became a major subfield by the early seventies. Two urban economists, Ronald Grieson and Duncan McRae (a joint appointment with the urban institute) were recruited, and several public economists and econometricians, in particular Engle, participated in associated projects. Although the relations with the CIS were going increasingly cold

(see below), the department was also deepening its expertise in development economics. Baghwati conducted research on exchange controls and liberalization and he was also editing a readings book on foreign aid. Domar was in charge of the analysis of communist countries (PR 70). Paul Rosenstein-Rodan and Eckaus produced case studies of Chile, and John Harris pursued his study of East Africa. Such activity was directly reflected in the evolution of the curriculum. Under the leadership of Rothenberg, there developed a teaching collaboration with the transportation system division of the school of engineering, and urban economics eventually became a new doctoral field. Harris was also teaching urban economics at the graduate level. A graduate sequence in development economics was set up under the leadership of Eckaus and Bhagwati, with the participation of Domar and Weitzman, while Temin and Kindleberger opened a course in economic history.[27] The 15 theses Adelman directed in that period also reflected a sustained interest in industrial economics.

The challenge of relevance

The challenges of the sixties were not only driven by scientific considerations. Like other universities, MIT had to face the social agitation resulting from the Vietnam war, the civil rights movement, the feminist movement, and the rise of the New Left. In 1966, the ties between the CIS and the CIA came under public scrutiny. During a meeting of the International Studies Association, Senator Wayne Morse (1966) warned his audience against blind confidence in purportedly ideologically-free academic research in political science and international relations, explicitly targeting the CIS. Journalists from the *New York Times*, the *Boston Herald*, and *The Nation* relayed the information. CIS alumni Marglin and MIT graduate student Tom Weisskopf were working in Delhi at that time, and the India officials they were working with immediately terminated their relationships with them. MIT economists, who had hoped to recruit those two promising development economists, interpreted their subsequent move to Harvard as a consequence of this "unhappy Indian accident." Worrying that their objectivity be compromised, the department's faculty also issued a collective statement calling for a reexamination of the funding of economics at MIT and asking for the termination of the CIA contracts. Aldeman complained that his research on energy, already suspect in those European countries where oil was a strategic commodity, would be further hindered by the association of MIT with the CIA. Domar similarly pointed that his longstanding association with Russia and various Western economies would be compromised. Kuh feared that the statements on policy issues that negatively characterized them would make their

[27] Fisher to Solow, 03/30/67, box 55, Solow to Fisher, 1967, aforementionned.

work become more difficult. Fisher, Kuh and Modigliani joined the chorus. As the Vietnam war escalated, the MIT radical students and faculty (Sidrauski, Foley, Matt Edel) hid, for several months, a drafted student who had gone AWOL (Nisonoff in Mata and Lee 2007). In November 1968, demonstrators invaded the Hermann building where the CIS was located. The following spring, classes were suspended in the wake of the demonstrations against the Cambodian invasion. In the name of the MIT faculty and graduate students, Solow drafted a letter to Paul McCracken, chairman of the CEA. He claimed that they were "horrified, saddened and angered by the Administration's desperate decision to invade Cambodia and urged him to "oppose any continuation of the war, both publicly and in your private dealings with the president.[28]"

The stagflation and the energy crisis soon added to the social troubles, resulting in a direct challenge of the economics undergraduate and graduate curricula. The New Left was on the rise, and in September 1968, radical economists founded the Union for Radical Political Economists. At MIT, some instructors began to question the content of the introductory economics courses as well as Samuelson's Economics, arguing that they didn't provide an introduction to Marxist economics, and that reading material from Heilbroner, Galbraith, and Baran and Sweezy should be introduced into the curriculum. Students repeatedly circulated petitions asking for new types of evaluations rewarding creativity. They criticized the compartmentalization of courses, and complained about the view that graduate students were merely " an input into a process the goal of which is to maintain the prestige of the MIT economics department and to spread the adoption of its approach to economics." Solow's claim that the MIT style was oriented toward policy relevance notwithstanding, MIT programs were perceived as too theoretically oriented and remote from real world issues. Stanley Fisher (2004) remembers that in the late sixties, it was Friedman's Chicago, not MIT, which was seen as the right place to apply economics to real issues (See also Shiller 2006 , 655). Underlying these protests was a demand for greater relevance that was spreading throughout the profession. The American Economics Association(???) responded with the creation of the *Journal for Economic Education*. Emerging from economists' promises to focus on a few basic economics principles and their various application to real-world issues, "issue-oriented" introductory courses were implemented throughout the country (see Fleury 2011's narrative on the problems of relevance and illiteracy and the emergence of the "economics made fun" movement). At MIT, attempts were made to revise the content of the two introductory economic courses to

[28] "MIT and the CIA, again" Ed Kuh, 06/14/1966. "A Statement of the relationships between the Center for International Studies at the Massachusetts Institute of Technology and the Central Intelligence Agency,"undated. Kindlebeger to Blackmer, 02/10/1967, AC394. Hall to Behr and response, *check date*, AC394. PR 1970. See Also Farish and Lackenbauer (2009, 551-552)

make it more "oriented toward problems of current interest – such as pollution regulation, the role of women in the labor force, gov regulation of industry, the energy crisis, the current food shortage, income distribution, the monetarist debate, wage and price controls." In 1974, it was decided that micro would precede macro so as to introduce economics through those problems that are most apparent to the non economist and in particular to the engineer. Also, from 1969 on, new readings which supplemented a textbook were introduced to reading lists: articles from *Challenge*, *The Public Interest*, *Public Policy*, articles by Kenneth Galbraith. The study of these articles was meant to "improve the students' understanding of econ concepts by showing him [sic] applications and provide factual background for the analysis of eco problems." Also, the use of problem sets was generalized.[29]

To meet the demand for greater relevance, MIT economists also turned back to their engineering tradition. On the model of the sustained collaboration with the department of urban studies and planning, Adelman established relationships with Paul Joskow from the Energy laboratory, and two joint appointments in 1974 brought the number of economic faculty members with appointments in other departments to 11 out of 32: Ann Friedlander served jointly with the Department of Civil Engineering, and Lance J. Taylor jointly with the Department of Nutrition and Food Science. The interest of the Institute as a whole and the broad concerns of engineers therefore influenced the research interests of economists at MIT (PR 1969)

Conclusion: A surviving "MIT style" of doing economics?

By the time the social troubles had calmed down, MIT had normalized its curricula, recruitment processes, and research programs. Although the Institute's unique identity was apparent in the development of certain subfields, the evolution of the department structures was now governed by the same forces influencing other leading departments in the country. The undergraduate and graduate programs had lost their specific distinction, while the use of mathematical tools had been accepted as the essence of economists' methodology (see Backhouse 2008). Attempts to build intellectual systems such as the neoclassical synthesis, (but also general equilibrium theories or simultaneous equations systems in econometrics) were being challenged everywhere, and MIT was becoming less identifiable with a specific intellectual content. Although Keynesian ideas continued to be taught in the seventies and eighties (Krugman 1995), graduate students such as Shiller also

[29] Letter to students, 02/01/1971; "Committee on the Undergraduate Economic Program. Final Report with Recommendations," 1968 or 1969; "Curriculum development- 14.01 and 14.02-Summer 1969;" "14.01-14.02 Proposed Revisions," by Peter Temin, 10/18/1974, AC394.

worked on rational expectations.

What remained specifically identifiable with MIT, in the end, was a "style" rather than a body of theories. The expression MIT-style economics/ approach/ theory is still used by all those who endorsed such a way of doing economics from the sixties on : Solow (2006, 662), Modigliani (in Solow 2007), Diamond 2010, Stiglitz 2001, and Merton 1997. Krugman's 1995 definition of the MIT style perfectly encapsulates the characterization given by its proponents: "small models applied to real problems, blending real-world observation and a little mathematics to cut through to the core of an issue." Such models are often referred to as "toy models," positively or negatively. If for its supporters, such as Merton 1997, the MIT style is in opposition to the Berkeley way of doing economics, "full general equilibrium models on a grand scale involving an arbitrary number of agents with general preferences and production technologies" (see also Solow 2007 and Diamond 2010 who opposed MIT "domesticated" mathematics with formalist research), the expression is often used to designate abstract cut-from-the-world research. Colander (1998, 5-6), for instance, accuses the MIT "formal approach" of eliminating intuition from economic analysis. Proponents and detractors however agree that the origins of the MIT approach to economics is to be found in Samuelson's models, such as the income expenditure model. Yet, it seems to be the personality of Solow that best embodies it; Foley contends that Stiglitz is "taking a (...) Bob Solow view of the way to work" and Krugman 1993 talks about the "Solow tradition"(see also Fisher 2004 and especially Blinder 2008). This tribute reflects the influence of Solow, not only as a researcher, but more specifically as the architect of the educational project that had made the success of MIT in the 50s and 60s.

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