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Classifying Economics: A History of the *JEL* Codes†

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In this paper, I suggest that the history of the classification system used by the American Economic Association (AEA) to list economic literature and scholars is a relevant proxy to understand the transformation of economics science throughout the twentieth century. Successive classifications were fashioned through heated discussions on the status of theoretical and empirical work, data and measurement, and proper objects of analysis. They also reflected the contradictory demands of users, including economists but also civil servants, journalists, publishers, librarians, and the military, and reflected rapidly changing institutional and technological constraints. Until the late 1940s, disagreements on the general structure of the classification dominated AEA discussions. As the subject matters, methods, and definition of economics rapidly evolved after the war, methodological debates raged on the status of theoretical and empirical work and the degree of unification of the discipline. It was therefore the ordering and content of major categories that was closely discussed during the 1956 revision. The 1966 revision, in contrast, was fueled by institutional and technical transformations rather than intellectual ones. Classifiers essentially reacted to changes in the way economists' work was evaluated, the nature and size of the literature they produced, the publishing industry, and the use of computer facilities. The final 1988–90 revision was an attempt by the Journal of Economic Literature (JEL) *editors to translate the mature core fields structure of their science into a set of codes and accommodate the new types of applied work economists identified themselves with. The 1990 classification system was only incrementally transformed in the next twenty years, but that the AEA is currently considering a new revision may signal more profound changes in the structure of economics.* (*JEL* A14)

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1. *Introduction*

Classifying economics might appear to be a routine and uncontroversial administrative task of no particular interest to economists.[1] However, that is not the case. When John Pencavel, then editor of the *Journal of Economic Literature* (*JEL*), initiated in 1988 the revision that created the classifications we use today, it took him two days to work out how to classify microeconomics. But macroeconomics took no less than two years of controversy. Previous revisions had also been very difficult, raising deep questions about the role of economic theory and its relation to applied work, as well as about the scope of microeconomics and macroeconomics. Proposed changes to the codes were seen as threatening or enhancing the status and future prospects of classified fields, and hence the careers of economists working in them.[2] The history of the *JEL* codes is thus essentially a story of how economists have perceived their discipline.

Though economists increasingly use keyword searches to locate material, the *JEL* codes remain important. They provide a map with which to navigate the discipline on the American Economic Association (AEA) website. They are used to publish and search job offers, skim job offers, assign grant applications and submitted papers to referees, and search for book reviewers.[3] Bibliometric studies of the characteristics of economists' publications, including size, age structure, coauthorship, subject matter, methodology, and citation patterns overwhelmingly rely on *JEL* codes to categorize papers, assuming a stability that did not exist in most categories (e.g., Gans 2000; Card and DellaVigna 2013; Silva and Teixeira 2008; Duarte and Giraud 2016). And it is because the classification matters that the AEA is currently contemplating yet another revision (Rousseau 2013; AEA 2014).

Classifications are the outcome of the process whereby individuals and institutions observe, list, name, order, and connect things. Historians of the Linnaean nomenclature of living species, Mendeleev's periodic table of chemical elements, Dewey's decimal classification for books, or the International Classification of Diseases, among others, have all emphasized how classifications are shaped by, and highlight, not only epistemological debates but also social contexts and technological infrastructures.[4] This literature, however, deals primarily with the scientific categorization of physical objects. The classification of scientific knowledge itself, which is what the *JEL* codes are doing, has received scant

[1] Among the historical accounts of the AEA and its publishing activities, for instance (Coats 1969, 1971, 1985, and Margo 2011), only Coats 1985 briefly mentioned early attempts to classify members of the association.

[2] See, for instance, the reactions to the recent establishment of a *JEL* code for "Sports Economics": http://www.byuresearch.org/naasportseconomists/ http:/www.byuresearch.org/naasportseconomists/ sea-new-orleans-2015/.

[3] See https://www.aeaweb.org/students/Fields.php.

[4] On the 1753 Linnaean classification, see Larson (1971) or Koerner (1999). Gordin (2002) replaces Mendeleev's 1969 periodic table in the context of St. Petersburg educational reforms in the 1860s and interprets it as a statement in the type theory versus organic structure theory debates that pervaded organic chemistry in these years. On the state of discussions on the influence Dewey should have acknowledged in the making of his 1873 decimal classification, see Wiegand (1998). Bowker and Star (1999) present a history of the International Classification of Diseases. Their book is notable in that it thoroughly examines the informational, intellectual, political, and performative dimensions of categorizing natural or social entities. The importance of classification as part of the information infrastructure is perhaps best seen in the history of the Memex, an imaginary mechanical device Vannevar Bush conceived of in 1945 to store individuals' knowledge, including books, records, and conversation transcripts. An ancestor of hypertext, the Memex would provide bookmarks and associative trails between elements. Each individual was supposed to index each knowledge entry in his personal codebook. As Nyce and Kahn (1991) shows, Bush's Memex was a pragmatic response to the information overflow he felt bogged down researchers in the late 1930s, and to what he considered a poor organization of information in libraries.

attention.[5] Classifying scientific methods, practices, literature, and even personnel, as the AEA has done for a century, creates different kinds of challenges.

The history of the *JEL* codes recapitulates longstanding debates on the relative status of theory and applied work, on the relevance of various approaches (historical, mathematical, experimental, game theoretic), and helps document the fate of many fields across the twentieth century. Yet the AEA classification does not provide a pure image of the discipline. Instead, it is a compromise between looking forward and looking backward, between AEA officials' sometimes conflicting visions of their science and the multiple and contradictory demands they face: editors needed a way to select reviewers and referees; recruitment committees needed a way to classify job candidates and their output; the government wanted a system to draft economists into the war effort, and later to recruit specialists into the various bureaus concerned with monitoring and managing economic affairs; librarians needed help in indexing papers and books; and the National Science Foundation (NSF) needed a classification to quantify and evaluate national scientific expertise. Some of these demands were internal to the profession, and others were external. Some dealt with literature, where it was not clear whether it should be classified by subject matter or approach, and others with the classification of economists themselves. The latter requirement created additional self-identification constraints, and the attempt to classify literature and personnel within the same system created an ongoing tension. Finally, as with any other information system, the AEA classification was heavily constrained by technological infrastructure—the use of punchcards and then rapid developments in computing and information retrieval systems—as well as by the technological and commercial evolution of academic publishing and, not least, by budgetary constraints.

My narrative is chronologically organized. Nevertheless, I will reprise three major points as the story unfolds. First, the evolution of the *JEL* codes reflected changes in the ways theory and applied work interacted. Second, the codes point to the transformation of the subject matters of the discipline and the rise and fall of different approaches to economics. Third, they reflect changes in the external pressures on the discipline and information technology. With these issues in mind, the paper examines the major revisions, undertaken in 1938–44, 1955–56, 1966, and 1988–90, with a new one pending. In each case, various demands, AEA classification suppliers' visions, and technological and institutional constraints interacted differently. The first efforts by AEA members to classify economic literature and personnel were influenced by war: government agencies needed to draft economists into the war effort and rebuilding the country. This external use appeared irreconcilable with economists' desire for a scientific taxonomy, with the result that several classifications were crafted (section 2). The next revision was driven primarily by the fundamental transformation in economics that took place after the war. Debates were therefore dominated by heated epistemological disputes among AEA officials. This time, it was the impossibility of reconciling the visions of different AEA officials that led to the development of several classifications (section 3). In contrast, the 1966 revision was about

[5] One notable exception is Hounshell's 2013 study of Columbia sociologist Karl Lazarsfeld's method files, a classification system for scientific articles that relied on his identification of the alternative methods a social scientist could pursue. Vidal (2011) traces the changing status of psychology in the eighteenth century, in particular with respect to anthropology, by studying its location in various science classifications provided in French *encyclopédies*. And Weldon (2013) explores the intellectual and social forces that shaped the Isis classification for the history of science.

rationalization. Multiple classifications did not immediately disappear, but they were brought closer. The revision was dominated by the need to harness the swelling tide of literature under strict budgetary constraints. The perceived solution was automating the AEA's bibliographic efforts. Old epistemological debates resurfaced, but they were heavily constrained by the need to adapt the classification to computerization (section 4). The latest revision (1988–90) was prompted by economists' frustration with the lack of space for new approaches. The *JEL* board of editors saw the stabilization of the discipline around a micro/macro/quantitative methods core, applied in a set of fields, as an opportunity to create a set of codes that could serve multiple functions. The making of the core categories, the consolidation of theoretical, empirical, and policy approaches, and the negotiations around which fields to list absorbed most of their energy (section 5). I conclude by speculating on the challenges the new revision faces.

1.1. *Beginnings: Classifying Literature and Personnel (1911–48)*

1.1.1 *Internal and External Demands*

The AEA's first classification was the result of Davis Rich Dewey's pragmatic and lonely attempt to arrange published reviews, book notes, and annotated titles according to their subject matter.[6] The idea had emerged in the fall of 1910. As Dewey was struggling to get the first volume of the *American Economic Review* (*AER*) out, he thought of drawing on the kind of structure found in Johannes Conrad's *Jahrbücher für Nationalökonomie und Statistik*, one of the oldest economics journals. "The general method seems to me to be serviceable; and, I believe, may result in an economy of space. The periodical literature I should group independently under topical headings, e.g., all the articles on 'British Fiscal Policy' under the title 'Workmen's compensation . . . etc.,'" he explained.[7] The first issue, published March 1911, used the following categories:

General Work, Theory, and its History
Economic History and Geography
Agriculture, Mining, Forestry, and Fisheries
Manufacturing Industries
Transportation and Communication
Trade, Commerce, and Commercial Crises
Accounting, Business Methods, Investments, and the Exchanges
Capital and Capitalistic Organizations
Labor and Labor Organizations
Money, Prices, Credit, and Banking

This list was then modified in subsequent issues, with no public statement ever being made about its rationale.[8]

Although this original list was aimed at organizing *literature*, it was the growing—yet now largely forgotten—need to classify AEA *members* that prompted open discussion of the methodology of classification. The AEA had always published an annual alphabetical directory of members, but the

[6] For a detailed account of Davis Dewey and subsequent *AER* editors, see Coats (1969). On the beginnings of the *AER*, see Coats (1969) and Margo (2011). Dewey was the older brother of psychologist and educational reformer John Dewey. They are not siblings of the architect of the decimal system. He was a professor of economics and statistics at MIT who specialized in economic history.

[7] Dewey to Kemmerer, November 26, 1910, box 66. Unless otherwise specified, all the archives references are from the Records of the American Economic Association, Economists' Papers Archive, Duke University. Archive material is referenced at the end of each paragraph or each subsection. On the *Jahrbuch*, see Menger (1889). Book reviews were organized by subject matter, rather than by alphabetical order, which reflected historical economists' interest in classification issues.

[8] In the volume information, these categories were listed in alphabetical order rather than in a specific order reflecting seniority, importance, or suggestive of any hierarchy between categories. Doctoral dissertations were listed by university. A competing list was that used by the Harvard editors of the *Quarterly Journal of Economics*, founded in 1886, to classify new books.

first free-standing biographical *Handbook of the American Economic Association* was not published until 1936. Yet, although the 1938 directory listed AEA members' self-reported "fields of interests" along with other data, secretary James Washington Bell felt the alphabetical listing offered no systematic way of knowing members' specialties. The need for such information was not merely intellectual and educational, it was also prompted by the executive committee's desire the preserve the association's scholarly and scientific character in spite of heterogeneous membership (Coats 1985, p. 1708).[9]

Systems that categorize economists were also increasingly requested by outside bodies. Business and governmental recruiters needed job candidates listed by skills and specialties.[10] Increasing pressure was put on the AEA to provide an adequate classification of its members as the war in Europe escalated and the likelihood of American involvement increased. Scholarly institutions, including the Social Science Research Council (SSRC) and the American Council of Learned Societies (ACLS), understood that scientists would soon be drafted to help with national-defense planning. In an effort to control the process, in the spring of 1940 they recommended the establishment of "a national agency for the registry and procurement of scientific personnel." Christened the National Roster of Scientific and Specialized Personnel, the governmental organization immediately set out to send a general questionnaire and a disciplinary "technical check list" of subject matters to all scientists in the country. Princeton psychometrician Carl Brigham, the inventor of the SAT, was entrusted with writing up the economics checklist. He knew that categorizing economists was "of utmost importance in national defense," but he found the task so arduous that, after other social sciences had returned their classifications, he requested that secretary Bell "give [. . .] immediate attention to this problem."

External pressure did not abate with the end of the war. In 1944, roster executives again asked Bell to provide a description of "economists," with an associated list of specialties, and requests to revise it regularly appeared over the next decade. The stakes were different, but no less high. Aware that scientists had been a crucial asset in the war, the Office of Defense Mobilization insisted on maintaining a national register of "scientific manpower." The government's requirement that all scientists be registered according to their field of expertise thus became permanent.[11] At the same time, government officials intended to set up a civil patronage system alongside the science–military partnership, under the leadership of well-known natural scientists such as MIT engineer Vannevar Bush. As would quickly become clear from the failed attempt to establish a social science division within the newly created National Science Foundation (NSF) in 1950, economists' scientific credentials were still much challenged, in particular the apolitical character of their knowledge, their ability to identify "laws," and even their social usefulness

[9] It was around that time that the introduction of a new and more democratic procedure for electing officers inspired proposals to restrict voting rights to "properly qualified" members, for example, PhDs.

[10] For instance, civil servants approached the AEA after the passage of the Classification Act of 1923, which sought to standardize jobs and salaries across its various departments and agencies (Coats 1985).

[11] The responsibility for maintaining this National Register of Scientific and Technical Personnel was transferred to the NSF in 1953, which again solicited economists to update their own classification during the 1960s (see section 4). In 1952, the ACLS and the Office of Naval Research additionally produced a National Register of Humanities and Social Sciences. It listed some 9,000 economists with at least a master's degree, classified according to subject-matter groups derived from the AEA classification (see, Wellemeyer 1953, AEA 1957).

(Solovey 2013).[12] Aware of this "salesmanship" issue, AEA officials understood that the classifications requested by various governmental agencies might help raise (or lower) the public image of the discipline.

1.1.2. *Divergent Visions of the Purpose and Structure of Classification*

For several years, AEA officials proved unable to cater to the needs of their members, business recruiters, and governmental organizations. Bell had officially opened a consultation to craft a classification for both literature and personnel for use in the next handbook, but by March 1940, significant divisions had already emerged within the AEA Executive Committee and its consultants over the structure such a classification should adopt. Very few economists wanted the classification to reflect a particular philosophical stance on the structure of the discipline, such as those offered by John Neville Keynes, John Stuart Mill, or Vilfredo Pareto. The one prominent exception was William Jaffé, who suggested that Léon Walras's division of economics among pure science, applied science, and social economics should serve as blueprint for the revision. Instead, contributors tended to adopt a pragmatic stance, best summarized by James W. Angell of Columbia: "the general test of the classification ought to be convenience in courses now taught and literature now appearing, rather than the logical requirements of the table of contents of a 'Principles of Economics.'" Dewey proposed an unsorted list of thirty-six subjects, including: Theory; American Economic History; Business Cycles; Marketing; Oil Industry. His approach was that of an editor. He explained that his cloud of keywords reflected his need to list potential reviewers, and that he feared that too exhaustive a classification would entail classifying most books into more than one category. Bell entertained very different ideas, circulating several comprehensive and logically ordered schemes, some explicitly designed to emulate the genus–species biological taxonomy developed by Carl Linnaeus during the nineteenth century. "I had hoped that we might work out a logical, fairly exclusive list of categories," he wrote, and "I still think it is possible if you adopt the main head-subhead, genus–species device. Highly complicated flora and fauna can be done under such a system, and I think human products and human interests can too." He therefore viewed the Linnean scheme as a way to tame complexity, though he did not delve into epistemological issues on the comparability of natural and human objects. His initial draft included nine categories, each divided between three and ten subcategories (see figure 1).[13]

One of Bell's proposals even outlined an explicit organizing principle: the first three categories were grouped under a heading, Methodological Economics, and the rest under Areas of Research, Including Specialized Theories, Technique, and Material. When Paul Homan was appointed editor of the *AER* in the spring of 1940, he looked for a middle way in between Bell and Dewey's systems. In August 1940, after

[12] Solovey (2013, ch. 1) related how Wesley Mitchel carried a "unity-of-natural-and-social-sciences" plea in the name of the SSRC to defend social-science's space within the NSF, but to no avail. In the early 1950s, the physical sciences received more than 70 percent of all federal science funds, the life sciences nearly 20 percent, and the social sciences stood at 3 percent.

[13] After Finance, there was Marketing and Trade; Public Utilities, Transportation, Communications; Labor; Production Economics; and Other Fields. In subsequent drafts, he took into account AEA members' suggestions and added new categories such as Land and Agriculture, Populations and Migrations, Money and Banking, or Risk and Securities. Bell's optimistic attitude toward the Linnaean classification contrasted with ecological researchers' gradual disillusionment. Kohler (2008) explains that, by the 1910s, ecology classifiers had come to realize that their objects were not objects as natural as botanical or zoological species were, that there existed no stable biological mechanisms that allowed them to trace boundaries between categories.

1. *Economics*
General economics
Economic theory
History of economic theory or economic thought or economic doctrine
Institutional economics
Mathematical economics
Business cycle theory

2. *Economic History*
Economic institutions
Business history
Industrial history
(Economic geography)

3. *Accounting; Statistics; (Qualitative Measurements)*
Business measurement
Accounting theory
Accounting practice
Statistical methodology
Mathematical statistics
Business cycle statistics and measurement

4. *Finance*

Figure 1. Excerpt from Bell's Draft Classification, January 1940

Source: See footnote 14.

1. General Works
2. Economic Theory and its History
3. Economic History
4. Economic Geography and Regional Economics
5. National Economic Systems and Politics
6. Public Finance
7. Statistics and Accounting
8. Money, Credit and Banking
9. Business Cycles
10. Securities Markets, Investment, and Insurance
11. International Trade and Finance
12. Business Organization and Law, and Corporation Finance
13. Domestic Trade and Marketing
14. Land Economics, Agriculture, and Fisheries

. . . .

Figure 2. Excerpt from Homan's Proposed Classification, August 1940

Source: See footnote 14.

what he described as "a trance-like period of illumination," he came up with a list of twenty-three subject matters without any subcategories (see figure 2).

The way categories were ordered in these proposals also revealed that AEA executives' definitions of economics diverged. Each system was headed with some kind of theoretical/general category, and two blocks of fields competed for the second tier. Bell and Homan opened their list of specialties with Business Cycles, Public Finance, Money and Banking, and Corporate Finance. Other proposals gave priority to Natural and Physical Resources of Production, Labor, and Business or Industrial Organization. A Keynesian focus on exchange and on the role of money in the production process was thus increasingly competing with the more classical interest in real production and the

Pattern of Classification of Fields of Economics

Methodology (Analytical, historical, quantitative)	*General* (Aggregative or macrocosmic approach—connective subjects—methods and application)	*Special* (Segments or applied fields—conventional subdivisions)
1. Economic Theory	4. Economic Systems; Planning and Reform; Co-operation	7. Money and Banking, etc.
2. Economic History; National Economies	5. National Income, etc.	8. Business Finance, etc.
3. Statistical Methods	6. Business Fluctuations	9. Public Finance
		10. International Economics
		11. Business Administration
		12. Indus. Org.; Pub. Reg.
		13. Public Utilities, etc.
		14. Industry Studies
		15. Land Economics, etc.
		16. Labor
		17. Social Welfare, etc.

Figure 3. The AEA Classification, 1948

efficient allocation of resources (Backhouse and Medema 2009).[14]

1.1.3 *Many Classifications for Many Uses*

Although Bell's sophisticated approach to classification encountered repeated opposition—it was considered "too elaborate" by the executive committee—he was eventually to see his scheme adopted by the AEA in 1948 (see figure 3).[15]

Presented in the pages of the *AER* with an accompanying methodological note (a first), the new scheme exhibited an overarching organization. The first three categories—Economic Theory, Economic History; National Economies, and Statistical Methods—were identified as methodological. The next three—Economic Systems, National Income, and Business Fluctuations, were introduced as "methodological subjects . . . more closely allied to problems of policies and processes . . . a general, aggregative and macrocosmic approach to the study of economics [that] combine[s] methods and applications" (AEA 1948). Eleven "applied fields" followed. An effort had been made to reduce the number of categories, which was achieved through the aggregation of several subject matters into Business Administration and Industrial Organization; Public Regulation. Each major heading was itemized in two or three subheads. The committee (AEA 1949) congratulated themselves for eventually achieving a "genus–species" classification and argued that such architecture enabled the AEA to order both personnel (by genus) in handbooks and publications (by species) in *AER* issues.

This type of classification was, however, a far cry from that eventually adopted by the

[14] Jaffé to Bell, March 27, 1940; Angell to Bell, April 20, 1940; "Preliminary Draft of Proposed Classification," Box 89. "Classification 2nd Draft," June 3, 1940; "Classification of Fields of Specialization—Third Draft;" "Draft Classification; A.E.A Executive Committee meeting, March 23, 1940;" Dewey to Bell, March 18, 1940; Homan to members of the Executive Committee, August 1, 1940; "Proposed reclassification. . ." July 1840; Box 89 folder "National Roster."

[15] The executive committee that approved the new scheme included Morris Copeland, Frank Fetter, Joseph Spengler, Homan, and Fritz Machlup, who had replaced Homan as *AER* managing editor in the years 1944 and 1945.

roster. When reviewing the various proposals forwarded by AEA, Brigham immediately rejected Bell's genus–species scheme as too elaborate. "The purpose of the Roster does not demand a clean-cut, logical system of classification," he explained. Rather, the technological constraints of the users of the classification, e.g., civil servants and the military, should be allowed to frame its structure: "a high degree of refinement does not lend itself to the punched card system. We must, therefore, start out with the punched card in mind and disregard to some extent certain highly analytical concepts," he wrote to Bell. Working from the perspective of suppliers as well as demanders of specialized personnel, he decided to fashion two classifications. One had been designed by *AER* editor Homan, with the help of Douglas Brown, and was intended as a list of 200 generic problems studied by economists, from plant locations to producing chemicals, union organization, city planning, crop estimates, and radio broadcasting. The other one was a list of commodities and manufactured articles that included poultry, potatoes, and corn to wool, flax, petroleum, zinc, fertilizers, alkalines, explosives, drugs, and machineries, among many others. Each economist would pick as many commodities as possible "within the restrictions of a two-column punch," and, for each one, would specify his principal "method of attack" from a list of ten entries, including extraction, manufacture, transportation, marketing, pricing, and wages. The shape of these two lists highlights that, while economics emerged from the war as the science of decision, it entered it as the science of production.[16]

Economists' reaction to Brigham's scheme epitomizes the challenges of accommodating various uses in one classification. When they remarked that the roster's plan was "simple, logical, but not comprehensive," Brigham again pointed out that his purpose had never been comprehensiveness, but the quick retrieval of a scientist's profile. The necessity to tailor a classification to each use was eventually acknowledged by Bell. When asked by the roster to provide a description of what economists did and to list their "branches" of specialization, he and some colleagues carved out a new (and non-comprehensive) classification consisting of only seven categories: Economic Theory; Money, Banking, and Finance; Industry; International Trade; Agricultural Economics; Labor Economics; and Socio-Economics. Aimed at a large audience of nonacademic recruiters, his leaflet briefly described each branch in simple terms.[17] It was introduced by an occupational summary that made it clear that the rationale behind this list was a definition of economics as the science of production:

> Economists study the whole process through which man makes a living and satisfies his wants for food, shelter, service or amusement, and the conditions favoring or hampering his economic development. This includes where, how and what man produces, how goods and services are distributed and paid for.

[16] At least, that was how it was viewed by public officials, who identified it as a "critical occupation" along with psychology and statistics, the latter being then considered a distinct science. Consequently, economics was one of the first sciences "circularized" in 1940–41. By mid 1941, 1,900 economists were registered by the roster, versus 3,900 psychologists, 1,700 statisticians, 600 anthropologists, 350 sociologists, and 3,600 historians and political scientists. More questionnaires had been sent to economists than psychologists (3,995 versus 3,443), but the response rate was lower. "National Roster of Scientific and Specialized Personnel;" Brigham to Bell, October 10, 1940; "Suggested Classification for Economists," October 14, 1940; "Classification of Raw and Manufactured Products and Associated Industries," October 18, 1940; "Total Questionnaires Mailed. . . " box 89, folder "National Roster."

[17] Those economists working in "Socio-Economics," for instance, "stud[y] broad developments as they affect the economic welfare of the country. This includes such subjects as population growth and movements; national income by social group; the occupational distribution of people; the conservation and use of such natural resources as minerals, water power, and land; and regional planning."

The brochure also emphasized that an MA or PhD was the best sign of economic proficiency. Showing that a classification was a highly strategic matter, Jules Backman, who was then involved in a dispute with the New York State Tax Department over whether economics was in fact a "profession," protested that this criterion was "pitched so high that only giraffes can reach it. We need a description low enough that some of the calves can get in" (Coats 1985, p. 1709).[18]

Early attempts to classify economic literature and personnel were thus dominated by the numerous internal and external demands AEA officials faced in the 1930s and 1940s. These were sufficiently hard to reconcile, so that several classification schemes were simultaneously designed, including sophisticated lists of subject matters, short lists of specialties, and lengthy lists of manufactured products. Many of these demands were underpinned by outside pressure on economists to define their profession and warrant their scientific credentials. As the discipline underwent a massive transformation in the decade after the war, economists became eager to fashion a classification that embodied a unified identity. Unfortunately, no convergence was to be found in AEA classifiers' endless methodological debates.

2. *In Search of Unity: Fights Over the Soul of Economics (1952–62)*

2.1 *New Demands Prompted by the Changes in the Nature and Scope of Economics*

War acted as a catalyst for the discipline. The changes in economics' methodology and content initiated during the 1930s accelerated in the late 1940s.[19] New fields thrived, including growth, development, and Keynesian analysis. Older subjects were approached differently, as new methods of inquiry were adopted: input–output methods, activity analysis, econometrics and quantitative analysis, and other forms of mathematical modeling. The definition of economics itself was shifting, with the traditional focus on wealth and production being gradually displaced by scarcity and problems of rational choice (Backhouse and Medema 2009). The marginalization of institutionalism reduced the diversity of approaches to economic problems (Morgan and Rutherford 1998). The number of AEA members nearly doubled between 1940 (4,000) and 1955 (7,500). Their growing production of books, reports, and journals fostered the development of commercial indexes, such as the *Reader's Guide to Periodical Literature*, which covered selected material from the *AER*, the *Quarterly Journal of Economics*, and the *Journal of Political Economy.* At the AEA, literature indexing had been discontinued before the war, but the literature expansion put pressures on editors to resume this activity. In the early 1950s, Don Patinkin and Mark Perlman, among others, repeatedly asked that a "cumulative analytical bibliography" be edited. Keeping track of AEA members was also difficult, as they worked not just in academia but also in education, government, and the military. [20]

Such changes were not restricted to economics. All social sciences had grown, experienced an empirical turn, and an expansion

[18] Bell to Brigham, October 15, 1940 and October 18, 1940; Brigham to Bell, October 21, 1940; Brigham to Mills, October 31, 1940; box 89. "Description of the Profession of ECONOMISTS. O-39.14," box 60.

[19] The best introduction to the postwar transformation of US economics is Backhouse (2008). Weintraub (2014) presents the major "metanarratives" whereby historians usually account for this transformation.

[20] See, for instance, the fourth Exhibit of the 1957 AEA handbook entitled *The Profession of Economists: Educational Requirements and Career Opportunities*. On economists' involvement with the government, see Bernstein (2001) and Fourcade (2009).

of their educational and governmental duties, although these played out differently in psychology, sociology, and anthropology (Backhouse and Fontaine 2009, 2010). A consequence was that social sciences classifications were flourishing worldwide. The Library of Congress had developed an economics section in its classification, the Institut National de la Statistique et des Études Économiques de Paris had recently issued a *Plan de Classification Décimale*, and UNESCO was sponsoring an *International Bibliography of Economics.*[21] While the Cambridge and Oxford libraries were developing systems of their own, variations of the *AER* classification were used by the Netherlands School of Economics, the Australian National Research Council, Johns Hopkins University, and the College of the City of New York. Librarians from many institutions, such as the Library of Congress and the British National Institute of Economic and Social Research were urging the association to provide a new classification scheme that could serve as a reference point for all the institutions dealing with economic literature (AEA 1957).

2.2 *A Revision Captured by Internal Epistemological Debates*

AEA officials were fully aware of the "international ferment of interest" in classification (Bell's words). They understood that the classification promulgated by the AEA would shape the discipline's public image at a time when economists' distinctive scientific credentials were still challenged.[22] They were also sensitive to AEA members' soul searching and need for a better grasp of the transformation of their discipline. One response to the latter was a two-volume *Survey of Contemporary Economics* (Ellis 1948; Haley 1952), whose purpose was to provide "the qualified layman, the beginning graduate student, and the public servant" with an account of economists' "main ideas—both analytical devices and their practical applications to public policy—which have evolved during the last ten or fifteen years" (Ellis 1948, p. v). In this intellectual context, the classification was considered another vehicle to showcase the growing unity of the discipline.

In the fall of 1955, Bell circulated a memo proposing to revise the AEA classification. He did not anticipate that it would provoke a prolonged and heated epistemological debate. Eager to provide a scheme that would adequately encapsulate the identity of the profession, the economists who were consulted argued for months over the respective status of theoretical and applied work, how and where to classify new modeling and measurement approaches, and which applied subject matters should be grouped together or given independence. In particular, the debates pitched former interim and current *AER* editors Fritz Machlup and Bernard Haley against one another. Both had done applied work: Machlup had specialized in international monetary economics, foreign exchanges, and industrial organization—especially patents and innovation; Haley had written on value and distribution, price controls, and cartels. They were thus interested in theories, but also in facts

[21] The Library of Congress Classification includes a class H titled "social sciences," which collapses statistics, economics, and sociology.

[22] In his 1953 AEA report on *Graduate Education in Economics*, Howard Bowen characteristically lamented the fact that "the economists of the United States are a small heterogeneous group without strong professional consciousness or powerful professional organization. They face public attitudes that are often indifferent and sometimes hostile. Their status as viewed by the public is lower than that of other learned professions" (quoted in Coats 1985, p. 1716). Thomas Carroll, an official from the Ford Foundation, who had become the largest patron for social sciences in these years, was making plans to open a "behavioral science program" in which economists would participate in interdisciplinary work alongside other social scientists (Pooley and Solovey 2010).

and institutions. Both were lauded for their broad knowledge of economists' practices and both had experience outside academia. Machlup had pursued a business career in cardboard manufacture during the 1920s, while Haley had worked for the Office of Price Administration and the Department of State during the war. [23]

Their main disagreement was over the possibility and desirability of establishing a separate top-level "theory" category. Machlup believed there should be one. His arguments reflected a mix of pragmatism—he wanted a classification with enough "class segregation"—and principle, resulting from his longstanding interest in methodological debates. Trained under Ludwig Von Mises in Vienna, at the time of the revision Machlup was engaged in a controversy with Terence Hutchison over finding a middle way between what he called Hutchison's "ultraempiricism" and Von Mises's "extreme a priorism" (Machlup 1955; see also Caldwell 1982). His solution was to differentiate between "fundamental (heuristic) hypotheses, which are not independently testable, and specific (factual) assumptions, which are supposed to correspond to observed facts or conditions; or . . . between hypotheses on different levels of generality and, hence, of different degrees of testability" (Machlup 1955, pp. 8–9). No such thing as "theoretically meaningful numbers" existed, so that theoretical and empirical work were altogether distinct. "I have not yet seen a single numerical parameter or coefficient in economics that could be derived from a theoretical system. As I see it, the numbers in economics are historical facts not theoretical," he wrote to Haley.[24] Likewise, "abstract" and "applied" theory could also be disentangled from each other, he explained:

> Of course, applied theory is also abstract to a certain extent. There can be only a difference in degree between abstract and applied theory. One can perhaps say that a theory should be called applied if it uses variable assumptions concerning political institutions. For example, the pure quantity theory of money might be called abstract. A monetary theory which discusses various kinds of banking institutions, different kinds of reserve requirements, different types of money substitutions, should be called applied theory . . . I have little difficulty putting Keynes' *General Theory* into my group [Abstract Economic Theory] and Keynes' *Treatise on Money* into group [Money and Banking].

Haley did not believe such a strict separation between theoretical and empirical work, or even between abstract and applied theory, was possible. "Is there any theory that is not abstract? And, for that matter, is there any economic theory worth its salt that is not applied," he teased Machlup. He wanted each category to cover a specific subject matter, theoretical *and* empirical. Even the top category was designed to encompass price theory, but also statistical demand analysis, as well as "both theoretical and empirical studies of, e.g., the consumption function, economic growth models of the Harrod–Domar variety, [. . .] national income accounting concepts and methods."[25] Moreover, he feared

[23] See Chipman (2008) for biographical material on Machlup. On Haley, see the "Memorial Resolution" drafted by Tibor Scitovsky, Moses Abramovitz, and Edward Shaw: http://historicalsociety.stanford.edu/pdfmem/HaleyB.pdf. Haley had edited the second AEA *Survey of Contemporary Economics* mentioned earlier.

[24] This idea was predicated upon a comparison with physics, which, unlike economics, involved "theoretically meaningful numbers." And even in this case, he had explained the previous year, "physical concepts are free creations of the human mind, and are not, however it may seem, uniquely determined by the external world" (Machlup 1955, p. 27).

[25] In response, Machlup denied any intention to isolate empirical work from the rest of economics: "Where I want to separate abstract, non-numerical studies from quantitative and numerical ones is only in analyses of the general system of economic theory. I believe there is a valid distinction between the comprehensive theoretical system and various applied subjects on which the general theory

that Machlup's proposal would create arbitrary separation, while he believed that the classification should bring unity. The establishment of a theory category would suggest that ". . . class 1 is theory, the rest are applied. But obviously, such a distinction cuts across subject-matter fields. How about monetary theory, international trade theory, business cycle theory? Do they all go into class 1? In my opinion," he continued, "the answer is to adhere strictly to a classification in terms of subject-matter fields." Accordingly, in his successive drafts, Haley consistently eschewed any "theory" headings, which he replaced with either General Economics, or with a combination of subject matters, such as Price Systems; National Income Analysis.

As far as measurement and data were concerned, Machlup was, not surprisingly, pushing for the separate category reproduced below:

Social Accounting, Measurements, and Numerical Hypotheses

a) Concepts of National Income and Wealth
b) Estimates of National Income and Wealth, Investment, Consumption
c) Measurement of Economic Activity (census data, expenditure surveys, etc.) comprising, for instance, Kuznets's work
d) Input–Output Matrices, Activity Analysis
e) Numerical Hypotheses (consumptions and investment functions etc.), including Koopmans' quantitative models

Haley supported the set up of a Statistics, Methods of Measurement group, but in addition to having a good deal of empirical work classified alongside theory, the category was more eclectic. It covered the 1948 category National Accounting, but also the various data produced through econometrics, activity analysis, or input–output analysis.[26] Discussions on the techniques themselves were to be filed under a Research Techniques, Economic Data category. Haley and Bell's proposals exhibited similar groupings, but the title Bell had envisioned—Economic Methodology—drew fire from Machlup. Economic methodology was a "philosophical activity," and it made no sense to juxtapose the methodological writings of Carl Menger, Schmoller, J.N. Keynes, Veblen, Schumpeter, Robbins . . . with articles on Chi-squared tests, he retorted.[27] The category was meant to cover mathematical economics, but many economists advised that the latter be removed altogether from the classification. Haley called it a "method of analysis of exposition" rather than a "kind" of economics, Werner Hildebrand agreed that it was a "means of communication and analysis."

Bell, Haley, Machlup, and their colleagues also argued over how to cope with emerging, expanding, and dying subject matters. That room should be made for the burgeoning fields of growth theory (to be classified under Income and Employment Theory) and economic development (to go along with Economic History in an independent category) commanded wide agreement. On the other hand, the former Public Utilities, Transportation, Communications, and Industry Study groups were integrated

is brought to bear. A quantitative study of the labor market surely belongs to labor economics . . . a quantitative study, however, of aggregate consumption or aggregate investment cannot be assigned to any applied field but should not be merged with abstract theory either. It is for such quantitative studies and numerical hypotheses that I wanted a special group together with national income analysis and other social accounting" (Machlup to Haley, February 3, 1956, box 102).

[26] A few months before, he had contemplated putting Social Accounting together with other macroeconomic subject matters in the first group. He also wanted activity analysis to be included in the first category under Price and Allocation Theory.

[27] Both methodology and history of economic thought were moved, in successive drafts, from one category to another depending on the aim of each researcher. While the latter eventually found home alongside price theory and income theory, "methodology" was eventually dropped from the final classification.

into Industrial Organization. Where to locate economic geography was more controversial. Machlup and others persistently argued it should be removed from its former Land Economics; Agricultural Economics; Economic Geography; Housing category and broken up between Area Studies and International Economics, where comparative analysis belonged. Likewise, Haley had initially planned to move consumption economics from the last category—Population, Welfare, and Living Standards—to the top category, alongside income analysis. This move was warranted by the shift from institutional to theoretical analysis the field underwent in the previous decade. Machlup wanted part of consumption studies to be filed under micro rather than macro, as they were related to the pure theory of consumer choice, and pointed out that institutional studies of consumer habits, what he called Home Economics, was well alive and in expansion.[28]

2.3 *The Resulting Compromise*

The final structure and wording of the final classification (see table 1) reflected an epistemological compromise between alternative visions of theory, empirical work, measurement, tools, and the field dynamics of the discipline. The compromise was also between forward and backward looking, and between the requirements that it should serve both for publications and personnel. Categories and their titles therefore needed to be framed in such a way that AEA members, researchers, teachers, civil servants, and business and industry economists could identify themselves with one or more of them. This was the reason why the former introductory General Economics category, originally deleted by Haley and Bell, was eventually reinstated. Many consultants, including IMF economist Richard Gooda, suggested that the tentative classification was too rigorous and too research oriented, and that General Economics would be a useful group within which to classify the activities of college teachers, the production of textbooks, etc. . . .

The Theory category was closer in spirit to the vision of Haley than Machlup's, allowing the classification of empirical work and activity analysis alongside theoretical models. Although Bell's original plans to name the category Micro and Macroeconomic Theory received wide support throughout the revision process, he eventually decided against it, won over by Machlup's somewhat contorted argument that there was no theory other than micro and macro, therefore the wording was redundant. For his part, Haley had conceded that many economists identified themselves with the "theory" label he had tried to avoid, and he agreed to have it reinstated. Haley also won the consolidation of national accounting into a category that eventually mixed methodological discussions, measurements, and data outputs. The AEA's heterogeneous membership—which included a sizeable cohort of statisticians—underpinned the decision to name the category Economic Statistics. Columbia economist Ragnar Nurske explained that "some members recognize themselves as specialized in a method and may apply it to, say, labor in one paper, transportation in another, and agriculture in a third. Their base of operations remains group 3 as it now stands." The same logic also prevailed in the naming of Business Administration, which Haley had tried to rename Economics of the Firm. Echoing business economists'

[28] From Box 102, folder "classification committee 1956": "Memorandum" from Bell, October 17, 1955; Comments by Machlup, undated; "Proposed Revision of Classification of Subject-Matters or Fields of Specialization," by Haley, undated, Haley to Machlup, December 7, 1955; Draft revision, fourth draft by Bell, and third draft by Haley, undated (probably January 1956); Machlup to Haley, January 17, 1956; Haley to Machlup, January 27, 1956; Machlup to Haley, February 3, 1956.

TABLE 1.
COMPARISON BETWEEN THE CLASSIFICATION SCHEMES USED IN 1949 AND 1956

AEA CLASSIFICATION 1949 (selected categories only)	AEA CLASSIFICATION 1956 (selected categories only)
1. ECONOMIC THEORY; GENERAL ECONOMICS a) Theory b) History of Theory c) Mathematical Economics	1. GENERAL ECONOMICS (teachers of general courses and all nonspecialists) 2. PRICE THEORY; INCOME THEORY; HISTORY OF THOUGHT a) Price and Allocation Theory (including general welfare economics, activity analysis, capital theory, value and distribution theory) b) Income and Employment Theory (including dynamic growth theory) c) History of Economic Thought
2. ECONOMIC HISTORY; NATIONAL ECONOMIES a) Economic History b) National Economies	3. ECONOMIC HISTORY; ECONOMIC DEVELOPMENT; NATIONAL ECONOMICS a) Economic History b) Economic Development c) Area Studies (regional and national economics)
3. STATISTICAL METHODS a) Statistical Methods b) Econometrics c) Economic Measurement	4. ECONOMIC STATISTICS a) Statistical Methods b) Econometrics c) Social Accounting (including distribution of income by size) d) Input–Output Analysis

(*Continued*)

misgivings, Machlup remarked that such a title was too restrictive; its meaning seemed exclusively derived from Marshall, Robinson, and Hicks.[29]

That both economic geography and consumption economics remained in their previous categories in spite of heated debates highlights the resistance to change classifiers encountered and the path-dependency embodied in the classification. While the classification committee attempted to anticipate the future evolution of the discipline, the categories still owed much to past changes. The case of consumption also shows how important classification choices were perceived to be for a given approach. A couple of years after the revision ended, George Katona, the Michigan architect of economic psychology, wrote to Haley that the classification of his new book on consumption behavior under Population; Welfare Programs; Standards of Living was very problematic. "The prevailing system of classification relegates the consumer to a minor place in the economy," he explained, and maintains a vision

[29] From box 102, folder "classification committee 1956": Gooda to Haley, October 13, 1955; Nurske to Haley, October 29, 1955. Hildebrand to Haley, October 13, 1955; Comments by Machlup, undated; Haley to Bell, October 5, 1955; Haley to Bell, January 13, 1956; Machlup to Bell January 31, 1956; letter from Machlup, February 1, 1956; Machlup to Bell, March 12, 1956.

TABLE 1.
Comparison between the Classification Schemes Used in 1949 and 1956 (*Continued*)

AEA CLASSIFICATION 1949 (selected categories only)	AEA CLASSIFICATION 1956 (selected categories only)
4. ECONOMIC SYSTEMS; PLANNING AND REFORM; COOPERATION	5. ECONOMIC SYSTEMS; PLANNING AND REFORM; COOPERATION
5. NATIONAL INCOME AND SOCIAL ACCOUNTING	
6. BUSINESS FLUCTUATIONS	6. BUSINESS FLUCTUATIONS
7. MONEY AND BANKING; SHORT TERM CREDIT. CONSUMER FINANCE	7. MONEY, CREDIT, AND BANKING
8. BUSINESS FINANCE; INVESTMENTS AND SECURITY MARKETS. INSURANCE	
9. PUBLIC FINANCE	8. PUBLIC FINANCE; FISCAL POLICY
10. INTERNATIONAL ECONOMICS	9. INTERNATIONAL ECONOMICS
11. BUSINESS ADMINISTRATION	10. BUSINESS FINANCE; INVESTMENT AND SECURITY MARKETS
	11. BUSINESS ADMINISTRATION; MARKETING AND ACCOUNTING
12. INDUSTRIAL ORGANIZATION AND MARKETS; PUBLIC REGULATION OF BUSINESS	12. INDUSTRIAL ORGANIZATION; GOVERNMENT AND BUSINESS; INDUSTRY STUDIES
13. PUBLIC UTILITIES; TRANSPORTATION; COMMUNICATIONS	
14. INDUSTRY STUDIES	
15. LAND ECONOMICS; AGRICULTURAL ECONOMICS; ECONOMIC GEOGRAPHY	13. LAND ECONOMICS; AGRICULTURAL ECONOMICS; ECONOMIC GEOGRAPHY; HOUSING
16. LABOR	14. LABOR ECONOMICS
17. POPULATION; SOCIAL WELFARE AND LIVING STANDARDS a) Population; Migration and Vital Statistics b) Relief, Public Welfare, Pensions, Social Security (including all public programs) c) Industrial benefit Programs d) Consumption Economics	15. POPULATION; WELFARE PROGRAMS; STANDARDS OF LIVING a) Population; Migration b) Welfare Programs and Social Security (public) c) Consumer Economics; Level and Standards of Living
	16. RELATED DISCIPLINES

of consumers as "uninfluential transmitters of trends." He interpreted the inappropriate categorization of empirical studies of consumers' motives, attitudes and expectations as a consequence of the low status of empirical research in relation to theory. He also emphasized that the *AER* editors had the ability to make such research more visible through altering the structure and titles of the classification categories as they had just done through the addition of "Related Empirical Studies" to the title of the top Price Theory category.

Machlup was nevertheless to see his plans for a category exclusively devoted to theoretical work implemented elsewhere. In 1956, the AEA decided to compile an index of past publications, a task entrusted to Yale industrial economist John Miller and librarian Dorothy Livingston, head of the Yale catalogue department. Their inspiration was the newly revised AEA classification for literature and personnel, but they found the reduced number of categories unsuited to the handling of articles on a cumulative basis. In 1958 they settled on a "telescopic" three-digit classification with twenty separate categories, including Economic Theory, Economic Systems, History of Economic Thought, Economic History and Social Accounting, and more than 700 subdivisions. Under Machlup's pressure, the index scheme exhibited the kind of broad theory category he was advocating, with development, business fluctuations, money and banking theories referenced alongside microeconomic and macroeconomic work.[30]

The 1956 revision was therefore remarkable in that it was captured by AEA classifiers' epistemological disagreements, their dual aspiration to record the ongoing unification of the discipline and to accommodate its diversity, and to allow economists' self-identification with the revised categories. The various other internal and external demands the AEA faced in those years received scant attention. The idea that the discipline was stabilizing around a "core" comprising microeconomics and macroeconomics was present in the debates, but there was as yet no consensus on the point. This evolution was documented by Yale national accounting specialist Richard Ruggles, who, a decade later, explained that the function of graduate training was "to provide a common core of basic economic theory," (quoted in Backhouse 2008).[31] Ruggles was to be in charge of the next revision in 1967. It might have been expected that this revision would have enacted the core/applied fields, but by this time the pendulum had swung back and the revision was largely determined by external factors: a request from the NSF, budget strains and the challenge of computerization.

3. *Rationalizing Classification (1962–1969)*

3.1 *Expansion, Budget Constraints, and the Need for Rationalization*

By the mid-1960s, the AEA's concerns about economists' public image and job opportunities had abated slightly. John Fitzgerald Kennedy was heavily relying on the expertise of Walter Heller's Council of Economic Advisors. The council's flagship proposal, supporting economic activity through tax cuts, was implemented in 1964.

[30] "Report on Cost Estimates for a Proposed Index of Economic Journals" by Dorothy Livingston, October 1956; Box 96, folder "Classification Committee." "Classification," January 6, 1958, Box 96, folder "Cumulative Index." Katona to Haley, September 23, 1960, Box 102, folder "classification committee."

[31] At that time, his wife Nancy Ruggles was working on the edition of a survey of the discipline under the auspices of the National Academy of Sciences and the SSRC. Published in 1970 as *Economics*, it was introduced by the idea that economics embodied a core/applied fields structure, which determined the outline of the book (Ruggles 1970, pp. 4–5).

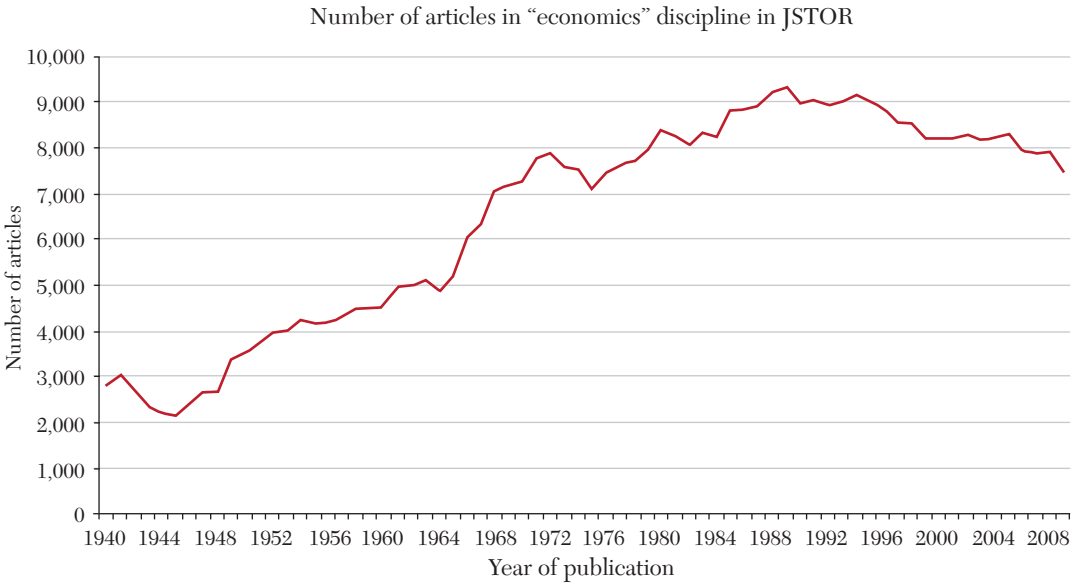

Figure 4. Number of Articles Listed under "Economics" Discipline in the JSTOR Database, by Year

Graduate programs and specialized professional societies within economics were being established, the economic PhD was widely recognized as the signifier of economic expertise, and the transition from military to civilian patronage was under way, with an NSF Division of Social Science eventually created in 1960. Although new subject matters and techniques were constantly being introduced, the broad structure of economics stabilized with the spread of general equilibrium modeling, the so-called neoclassical synthesis, and econometric techniques. What nurtured AEA officials' belief that they needed to *rationalize* their classification practices rather was a sense of impending crisis in the AEA publishing business.

Economic personnel and literature were both proliferating. The AEA membership increased from 10,000 in 1959 to 17,000 in 1968 and remained heterogeneous. A 1964 survey indicated that 45 percent of AEA members worked in educational institutions, 13.5 percent for the government, and 35 percent in industry and business (Tolles 1965). AEA editors estimated that the literature of economics had grown by 300 percent in the previous twenty-five years. Evidence for this is found in the dramatic increase in the number of economic articles JSTOR database in the mid-1960s (see figure 4).

This expansion was causing problems for the *AER*. Even though its page count had increased by 50 percent over twenty years to 1,965, and the number of papers published had risen from forty-seven to sixty-two, this fell behind the growing number of submissions. From around 230 in 1955, submissions rose to some 420 in 1966, before peaking at 637 in 1968. There was a growing sense that many good papers were being rejected, but the space, time, and money necessary to increase the proportion published were not there, despite the recruitment of an assistant editor in 1963. Between 1954 and 1969 the number of *AER* referees increased from 36

to 220. There was a corresponding increase in the number of periodical abstracts, book reviews, and review articles, and the task of classifying the swelling tide of publications was very labor-intensive (Margo 2011, pp. 21–3). Additionally, economists complained that it was increasingly difficult to keep abreast with the flow of information necessary to undertake research.[32] The AEA classification was now under scrutiny as an information system, rather than as a device to instill consistency or to publicize economics. Coverage deficiencies were pointed out in existing classifications, so that Yale classifiers decided to raise substantially the number of journals indexed.[33] Another response to the crisis was the creation of the *Journal of Economic Abstracts* in 1964, but the lack of budgetary and human resources created managerial tension between Arthur Smithies, its editor, and the newly appointed editor of the *AER*, John Gurley, whose staff was in charge of drafting the abstracts.

Managing the swelling tide of publications was not a problem specific to economics; AEA editors' complaints were finding an echo in the humanities and other social sciences. The editors of the *American Political Science Review* and of the *Writings of American History* had recently decided to discontinue their own bibliographical sections on account of the impossibility of providing adequate coverage of their disciplines' publications. Only those disciplines whose professional societies had turned to computerization, such as chemistry, biology, and medicine, were able to cope with the mounting bibliographical load. By the mid-1960s, many reports detailed the pioneering development of a computerized retrieval system, MEDLARS, by the US National Library of Medicine (NLM). The original failure of its Index Mechanization Project in 1960 had highlighted that such a project should start with the design of the retrieval system before the publication system was conceived. Indeed, the implementation of the MEDLARS project had required a prior update of the NLM's classification system, the Medical Subject Headings (MeSH; see Dee 2007).[34] In 1966, IBM awarded a three-year grant to the ACLS to computerize the new *Répertoire International de la Littérature Musicale* and establish a bibliographical data processing center in the humanities, the definition of which was extended to include economics. Those early efforts, however successful, were tedious and time consuming. Although information retrieval, programming, and hardware had been improved considerably under the leadership of the Department of Defense during the previous decades, applying those techniques to the specific needs of such a wide range of scholarly disciplines was extremely complex and costly.[35]

In addition to these pressures, public agencies were still concerned with having an inventory of the growing number of scientists in the country. The purpose of the Register of Scientific and Technical Personnel, maintained since 1954 by the

[32] In 1969, Mark Perlman estimated that "there are published each year between 1,300 and 1,500 books of some significance to the discipline [and] more than 250 journals carrying . . . more than 5,000 major articles" (quoted in Margo 2011).

[33] A survey of 32 Yale faculty members had shown that only 37 percent of their publications fell within the scope of the current *Index*, since 10 percemt of their output was books, 32 percent chapters in collective volumes, and 20 percent in non-indexed journals (see Ruggles's 1967 report and Econometric Society's 1969 report, referenced in note 41).

[34] The structure of the MeSH and *JEL* classifications are close to each other. MeSH descriptors are arranged in a twelve-level hierarchical structure, and are used for indexing the articles of most biomedical journals.

[35] Box 104, folder *Journal of Economic Abstracts*: Smithies to Gurley, February 21, 1964; Gurley to Smithies, March 11, 1964. "Preliminary Report to the A.E.A. Committee on Classification . . . ," by Richard Ruggles, March 1, 1967. Box 922 folder "NSF Revision of 1968 Specialty List," and Box 965 folder "classification."

NSF, had evolved alongside US international relations. Originally aimed at identifying specialized personnel in case of national emergency, it had turned into a major source of statistical data on scientific and engineering personnel for studies related to the development of national science policy and for public, educational, and private recruitment. Relevant data were extracted from questionnaires sent directly by scientific associations and professional organizations to their members in numerous fields. Among other queries, respondents were asked to select four specialties from a list. It was only in 1964 that the AEA agreed to join the census. The questionnaire sent to economists in the summer of 1964 was likely designed under the supervision of Cornell Professor Arnold Tolles (Williamson 1964, p. 644). Aimed at facilitating respondents' self-classification, the economic "specialty list" it included was an updated version of the 1956 AEA scheme (see table 2). The top-level theory group opened with a new category, General Equilibrium, which had become a significant and high-prestige area of analysis. It was followed by Economic Fluctuations, Economic Forecasting, Methodology, and Microeconomic Theory. That macroeconomics was still missing from this list indicated that the scholarship it spanned was not as clearly defined as in microeconomics. Economic History and Development had been granted separate categories, as had Agricultural Economics and Land Economics, while Money and Public Finance had been collapsed.[36] The AEA found the NSF system sufficiently useful that it adopted a variant of the "Economic Specialty List" in its new handbook published in 1966.

3.2 *A Revision Constrained by External Demands*

The AEA was thus confronted with the dual challenge of improving the quality of its information system to manage the literature, while lowering the cost of its bibliographic activities. The way other sciences had solved such problems clearly pointed to the solutions AEA editors should emulate. They needed to avoid unnecessary duplication in costly classification processes (articles were classified by a team of trained specialists rather than by authors themselves) which called for a unification of the *AER*, the index, and the handbook classification systems. Reducing the costs of this labor-intensive process and enhancing the coverage and quality of the classification would come from rationalizing and then computerizing procedures, and the MEDLARS case had made it clear that a successful information retrieval project required a preliminary adaptation of the classification system (Leftwich 1968).

At the beginning of 1967, Ruggles became director of the Yale index and, eager to rationalize the classification, he wrote a careful analysis of the various purposes of existing classifications, accompanied by a quantitative assessment of their performance. The *AER* classification, whose purpose was to "handle the current flow of information" without leaving categories empty or concentrating articles too much was not accomplishing such a balance. Statistical evidence indicated that, while History and Development, Price and Allocation Theory, and International

[36] Four hundred forty thousand questionnaires were mailed by scientific associations, with 62 percent responses, among whom 12,143 had identified themselves as economists given the specialties they had chosen in a list of more than 1,172 subject matters. In its first part, he detailed the NSF's peculiar definition of "economists" as professionals working in educational institutions, the federal government, industry, and business, mainly with at least a BA in economics and actively associated with a relevant professional society. By comparison, in 1959 the Bureau of the Census had counted 22,500 economists based on another definition (Dec 65 R, 11; Box 922, Folder "Arnold Tolles Corresp plus Ad Com (NSF)").

TABLE 2.
Comparison between the Classification Schemes Used in 1956 and 1967

AEA CLASSIFICATION 1956 (*Selected categories detailed only*)	AEA CLASSIFICATION 1967 (*Selected categories detailed only*)	NSF CLASSIFICATION 1965 (*Selected categories detailed*)
1. GENERAL ECONOMICS (teachers of general courses and all nonspecialists)	000 GENERAL ECONOMIC THEORY; HISTORY; SYSTEMS	GENERAL ECONOMIC THEORY
	. . . .	General Equilibrium
	020 General economic theory	Economic fluctuations
2. PRICE THEORY; INCOME THEORY; HISTORY OF THOUGHT	021 General Equilibrium Theory	Economic forecasting
a) Price and Allocation Theory (including general welfare economics, activity analysis, capital theory, value and distribution theory)	022 Microeconomic Theory	Methodology
b) Income and Employment Theory (including dynamic growth theory)	023 Macroeconomic Theory	Microeconomic Theory
c) History of Economic Thought	024 Welfare Theory	Other
	. . . .	
		ECONOMIC HISTORY; HISTORY OF THOUGHT
3. ECONOMIC HISTORY; ECONOMIC DEVELOPMENT; NATIONAL ECONOMICS	100 ECONOMIC GROWTH; DEVELOPMENT; PLANNING; FLUCTUATIONS	ECONOMIC SYSTEMS; DEVELOPMENT AND PLANNING
a) Economic History		
b) Economic Development		
c) Area Studies (regional and national economics)		
5. ECONOMIC STATISTICS	200 QUANTITATIVE ECONOMIC METHODS AND DATA	ECONOMIC STATISTICS
a) Statistical Methods		Econometrics
b) Econometrics		Input-output and programming methods
c) Social Accounting (including distribution of income by size)		Social accounting
d) Input-Output Analysis		Statistical methods
6. ECONOMIC SYSTEMS; PLANNING AND REFORM; COOPERATION		

(*Continued*)

Economics each collected 350 to 450 entries in 1965, Economic Systems was used for barely 50 articles. Similarly, although the 700 index subclassifications were legitimized by the need to handle articles on a cumulative basis, 50 percent of them contained five articles or fewer in 1964–65, and 113 of them were empty. Conversely, fifty subcategories contained twenty-five articles or more, and far too many articles were concentrated within the single class Economic Theory. As for the handbook–NSF biographic classification, it

TABLE 2.
COMPARISON BETWEEN THE CLASSIFICATION SCHEMES USED IN 1956 AND 1967 (*Continued*)

AEA CLASSIFICATION 1956 (*Selected categories detailed only*)	AEA CLASSIFICATION 1967 (*Selected categories detailed only*)	NSF CLASSIFICATION 1965 (*Selected categories detailed*)
7. BUSINESS FLUCTUATIONS	300 DOMESTIC MONETARY AND FISCAL THEORY AND INSTITUTIONS	MONETARY AND FISCAL THEORY AND INSTITUTIONS
8. MONEY, CREDIT, AND BANKING		
9. PUBLIC FINANCE; FISCAL POLICY		
10. INTERNATIONAL ECONOMICS	400 INTERNATIONAL ECONOMICS	INTERNATIONAL ECONOMICS
11. BUSINESS FINANCE; INVESTMENT AND SECURITY MARKETS	500 ADMINISTRATION; BUSINESS FINANCE; MARKETING; ACCOUNTING	BUSINESS FINANCE AND ADMINISTRATION; MARKETING AND ACCOUNTING
12. BUSINESS ADMINISTRATION; MARKETING AND ACCOUNTING		
13. INDUSTRIAL ORGANIZATION; GOVERNMENT AND BUSINESS; INDUSTRY STUDIES	600 INDUSTRIAL ORGANIZATION; TECHNOLOGICAL CHANGE; INDUSTRY STUDIES	INDUSTRIAL ORGANIZATION; GOVERNMENT AND BUSINESS; INDUSTRY STUDIES
		AGRICULTURAL ECONOMICS
14. LAND ECONOMICS; AGRICULTURAL ECONOMICS; ECONOMIC GEOGRAPHY; HOUSING	700 AGRICULTURE; NATURAL RESOURCES	LAND ECONOMICS
15. LABOR ECONOMICS	800 MANPOWER; LABOR; POPULATION	LABOR ECONOMICS
16. POPULATION; WELFARE PROGRAMS; STANDARDS OF LIVING a) Population; Migration b) Welfare Programs and Social Security (public) c) Consumer Economics; Level and Standards of Living	900 WELFARE PROGRAMS; CONSUMER ECONOMICS; URBAN AND REGIONAL ECONOMICS	POPULATION; WELFARE PROGRAMS; STANDARDS OF LIVING
		STATISTICS
RELATED DISCIPLINES		MATHEMATICS OF RESOURCES USE Activity Analysis Actuarial mathematics Biometrics; biostatistics . . . .

was considered quite balanced, with the largest groups and subgroups—Microeconomics and Agricultural Economics—each containing 7.5 percent of economists, and Economic Development and International Trade, 4.5 percent each. Ruggles concluded that it was possible to create a three- or four-level system to accommodate all three uses in a single scheme.[37] This organization was seen as a way to tame complexity, lower the cost, and improve the quality of data collection, storage, and processing, with no need for double-checking and less proofreading. Ruggles also wondered whether asking authors to classify their own writing would yield better data at a lower cost.[38]

In the summer of 1967, secretary John Williamson, aided by a classification committee composed of Gurley, Smithies, and Ruggles and chaired by Leftwich, began gathering suggestions to respond to the issues Ruggles had raised. Although they were not pivotal to the decision to undertake a revision, debates over the top category and whether theoretical and empirical work should be separated surfaced again. It was only by chance that these debates did not take over the revision, as had happened a decade before. In August, the NSF reported complaints from AEA members that the Specialty List did not adequately reflect their interests, and requested an updated version by early September. This unanticipated demand induced the committee to start out from a recently updated classification explicitly tailored for economists' self-identification, and the short notice cut short the scope for discussions and disagreements. When Bell, Ruggles, and their colleagues realized that an intermediate level of titles between the major categories and the detailed specialties of the revised NSF scheme could be added to provide the unified classification they longed for, they focused on making the architecture fit for mechanization and computerization.

3.3 *The Challenge of Classifying an Expanding Discipline*

The committee's decision to settle on maximum of ten categories, each itemized in no more than ten subcategories, and so forth, made the problem of grouping crucial (see table 2). It prompted Williamson to propose the enlarged NSF Theory category reproduced below, one that, again, concentrated much of the debates:

General Economic Theory
General Equilibrium
Microeconomics
Macroeconomics
Economics Fluctuations
Economic Forecasting
Methodology
History of Economic Thought
Others

Ruggles found the word "theory" a particularly unsuitable general heading for a category that was supposed to encompass Economic Fluctuations and Forecasting, since these two specialties essentially comprised empirical work conducted by practitioners. He wanted to rename the category General Economics and, echoing Haley's earlier misgivings, he underlined that "many people work in both theory and empirical research, and separating the two is often not possible. Even for economic literature, it may in the future be more reasonable to abolish theory as a major category." The change was not implemented. Instead, Leftwich moved Economic Fluctuations to Monetary and Fiscal Theory: "actual economic fluctuations

[37] Broad categories (ten to twenty) would serve as a frame to handle the current flow of articles, subclassifications (forty to sixty) would help classify personnel, and third and fourth levels (150 to 200 entries) would later be added for cumulative indexing.

[38] Ruggles' advice was based on a similar request made by the Econometric Society to its members in 1957. Ninety percent of them had duly provided extensive bibliographical information on their work for the previous ten years.

and their control is one of the very important reasons for worrying about monetary and fiscal institutions—isn't it?" he pointed out. In the end it was consolidated with Economic Growth and Development, alongside Forecasting. Baumol would have rather seen the latter under a new category titled Applied Economics, along with Operational Research.[39] Leftwich's recommendation to add General Welfare Economics—"it really has to do with [. . .] optimizing behavior"—commanded wide agreement, as did the first appearance of a Macroeconomics title in the AEA classification. This set of subjects, closest to the then stabilizing "core," ended up as a subpart of a wider top category that also covered history of economics, economic history, and economic systems. What was to be filed under the new Quantitative Economic Methods and Data category, which some had attempted to rename Mathematical Economics, was also unclear. A new Cost–Benefit Analysis subclass was added, but later removed, for Ruggles believed that it was a technique used in a variety of fields such as economic development, education, and health economics.

Reducing the number of categories to ten also made it impossible to accede to the request, made by many economists, that Urban Economics, widely perceived as the hottest field in these years, should be granted a separate category. It therefore remained in alongside Welfare Programs and Consumer Economics in the last category that saw considerable expansion with the addition of Education, Health, and Poverty specialties.[40] Reducing the number of categories resulted in broader fields comprising diverse specialties, and saw the development of a large and fluid applied microeconomics field. A surprising effect of these mergers was the disappearance of a separate Public Finance category at a time the field was booming—it was merged with monetary economics.

The NSF's request for a quick update of its classification for economists therefore acted as a catalyst for a new revision, but economists pursued their own agenda: improving the quality of the information retrieval system they used to navigate the booming literature, lowering the costs of maintaining it, and moving toward computerization. In that respect, the resulting three-digit hierarchical decimal classification scheme was successful. Plans for the development of a unified "System for Information Processing for Professional Societies" that would create an inventory of all members, then their work, began in 1969 when the Econometric Society and the American Statistical Association computerized members' responses to the annual questionnaire, and pushed the AEA to do the same. The computerization of literature indexing continued, so that in 1983, an Economic Literature Index (ELI) whereby researchers could retrieve publications on a given subject, was made available online through the DIALOG system. It was later turned into EconLit. Soon after its revision, the management of the classification system was transferred to the *Journal of Economic Literature,* created in 1969. Edited by Mark Perlman, the new journal was to provide the abstracts previously included in the *JEA*, alongside book reviews, listings of new books, review articles, and a quarterly

[39] He also advised adding Mathematical Economics and Activity Analysis and Mathematical Programming specialties to Economic Theory.

[40] This last category also came to include Regional Economics, designed to receive those works in economic geography that had previously been classified under Land Economics. Studies on forestry and fisheries were collapsed into Agricultural Economics, with the research pertaining to natural resources and analyses of transportation systems moved to Industrial Organization. Labor Economics was also revised to include mobility, migration, and, at Ruggles' suggestion, major regulations such as the minimum wage.

subject index of articles to be aggregated in an annual "Index of Economic Literature." However, neither the revision and computerization of classification procedures nor the creation of the new journal solved the budgetary and publishing crisis.[41]

4. *Mapping a Stabilized Discipline and an Institutionalized Profession (1988–90)*

4.1 *The* JEL *Codes as an Intellectual and Institutional Map of Economics*

During the 1970s and 1980s, the literature continued to expand, although less rapidly, with the result that budgetary pressures on AEA publications did not abate, threatening its bibliographic activities. In the early 1970s, AEA secretary Rendigs Fels criticized the *JEL* for being too expensive.[42] In 1982, after new editor Moses Abramovitz threatened to resign, a shared *JEL* editorship was contemplated, as was splitting the journal back into a survey journal and an index. Neither of these suggestions was implemented though, when the first issue of the *Journal of Economic Perspectives* appeared in 1987 with the aim of providing nontechnical surveys of recent scholarly advances. Eliminating the *JEL* articles department was again considered, but eventually rejected at the time.[43] Throughout, *JEL* editors resisted abandoning a system whereby articles were allocated a code by a staff of trained classifiers and switching to the kind of self-classification by authors used for the UNESCO indexing system.

Economists' attitudes toward their classification system was also changing. The development of ELI/EconLit initiated a process whereby literature search was increasingly done through keywords and less through *JEL* code filtering, although the latter was still dominant in the 1980s. As the discipline grew in size and scope, its unification around a core mentioned above was paired with a process of fragmentation and specialization. From the late 1960s to the 1980s, many specialized journals were founded, including the *Journal of Economic Theory* (1969), the *Journal of Public Economics* (1972), the *Journal of Urban Economics* (1974), the *Journal of Development Economics* (1974), the *Journal of Health Economics* (1982). These new journals were usually attached to new field societies and conferences. New approaches were also gaining traction. The development of experimental economics culminated in the foundation of the Economic Science Association in 1986 (Svorenčík 2015), the same year as the Russell Sage Foundation's Behavioral Economic Roundtable was formed (Heukelom 2014). Economists increasingly relied on the *JEL* codes as a map to navigate the profession intellectually

[41] Box 922 folder "NSF Revision of 1968 Specialty List." Gurley to Smithies, March 4, 1966. Gordon to Gurley, November 4, 1966 and "Computer, Traditional Scholarship, and the ACLS," Report by Thomas Gordon, Box 104 folder "*Journal of Economic Abstracts.*" "The development of the Biographical-Bibliographical Indexing System for Economics," January 1969, Box 940. "Proposal for the Development of Capability for a communication Network for Economists," Econometric Society, September 2, 1969, box 940. "Application for a Development Grant by the AEA to the Office of Science Information Services to the NSF," Box 939. Ruggles to Friedman, November 27, 1967, and Ruggles to Williamson, November 3, 1967, folder "Classification," Box 965.

[42] In response, Perlman explained that part of the costs related to classification had been graciously supported by the many editors' wives in office during the 1950s and 1960s: Nancy Ruggles and Mrs. Gurley were in charge of the *AER* book section, and Truus Koopmans was responsible for much of the office work done for the Yale index (see *JEL* 9(3), p. 956).

[43] "The development of the Biographical-Bibliographical Indexing System for Economics," January 1969, Box 940. From box 939: Perlman to Fels, October 14, 1970; Perlman to Fels, February 12, 1971; "Application for a Development Grant by the AEA to the Office of Science Information Services to the NSF." From Box 934: Fels to Rees, September 21, 1982; "Report of the *Ad-Hoc* Committee on Publications," by Fels, October 1, 1982. Pencavel to Board of Editors, February 6, 1987, Box 955.

and institutionally: to place their work within the discipline and to publish and screen job offers, scroll conference programs, apply for grants, and choose referees. Getting a code, and having it placed in the right category, became an increasingly important element in establishing intellectual and institutional space within the profession.

It was no surprise, then, that John Pencavel, who replaced Abramovitz as *JEL* editor in 1986, took AEA members' growing dissatisfaction with the classification very seriously. Since the classification had been placed in the *JEL* editor's hands, it had been curated on a more regular basis. Incremental changes had been decided upon and implemented through exchanges between the *JEL* board of editors and the Pittsburgh office, where the bibliographical department was managed, first, by Naomi Perlman, then, from 1985 onward, by Drucilla Ekwurzel.[44] That same year, long-term consultant Asatoshi Maeshiro, of the University of Pittsburgh, was officially appointed "classification consultant," a position he held until his retirement in 2006. As an econometrician, he took special care to update the quantitative techniques category. Yet, economists increasingly complained that the General Economic Theory and Econometric Theory categories were insufficiently detailed, and that no entry existed to accommodate new kinds of model, such as found in the flourishing literature on game theory. Likewise, the creation of an Experimental Economics code within the Quantitative Economic Methods and Data category in 1985 made experimental economists uneasy. They feared that a separate category would relegate them to specialized journals, equate their methods with pedagogical tools, and prevent them from applying for most job openings. In a recent witness seminar, Caltech's Charles Plott explained why he did not want to see experimental work classified separately:

> Well, I think that we were dealing with the [empirical] foundations of economics [but] economics does not have [such] a classification. If the experiment was a committee experiment, I would have put it having to do with something with public choice. If it was a market experiment, I would have had it in microeconomics. I wouldn't have separated it out as anything special. It is data about phenomena [and the empirical relationships the data present]. But that is the way it was treated—just education. [45]

Pencavel thus understood that a radical overhaul was necessary. He was aware that economists expected the classification to reflect the current structure of the discipline, and that, like Plott, Kagel, or Katona before them, economists would fight for the codes they felt would give them a confortable position within the discipline. He also wanted to design a system that "facilitate[d] the search for information by economists and best summarizes the content of bibliographic material." A result of these various motivations, he was eager to finally set up representative Microeconomics and Macroeconomics categories, and to record the growing independence of several applied fields. He had probably not anticipated that his agenda would throw him, Ekwurzel, and Maeshiro into two years of complex negotiations.

[44] Drucilla Ekwurzel was appointed Associate Editor. She had been a long-term assistant editor for the *JEL*, first in charge of proofreading, and after 1981 in charge of classification matters. After 1985, she focused on the migration from the DIALOG to the EconLit system.

[45] "I agree 100 percent that they should be classified by the topic, by the subject matter of whether you are dealing with, say, auctions or you are dealing with voting and this sort of thing, because it is a tool. It is not like econometrics. It is very far from econometrics where there are real high-powered techniques that are being developed all the time," Ohio's professor John Kagel added. Elizabeth Hoffman, from Iowa State University, also explained that she was advised against advertising herself an experimental economist when she was on the job market, at the turn of the 1980s. A full transcript of the witness seminar can be found in Svorenčík and Maas (2015).

4.2 *Making Up the Core*

Pencavel quickly settled on the general structure of Microeconomics. His goal was to accommodate research in "rapidly expanding areas . . . such as game theory and principal–agent models." His initial draft listed eight subgroups: Household Behavior, Production, The Market (a category covering different types of competition and pricing), Interacting Firms, General Equilibrium and Disequilibrium, Economic Welfare (ranging over externalities, social welfare functions, rent seeking, and inequality), Uncertainty and Information, and Intertemporal Choice. Game theory was dispatched into several of these groups, with the precise location of a particular type of work depending on the characteristics of the games. As the revision proceeded, it would eventually be reunited as a single subgroup within Microeconomics, then, as the Mathematical and Quantitative Methods category took shape, moved alongside programming and data collection, where it still stands today. By the end of 1988, Distribution and Collective Decision Making subgroups were also added (see below), and the titles and contents of several three-digit entries were being discussed.

In contrast, Macroeconomics underwent endless rounds of rewriting.[46] Pencavel initially intended to end the previous classification's "uncomfortable division" of macro between Macroeconomic Theory and Economic Growth • Development • Planning • Fluctuations. Yet, his initial plan to break down Macroeconomics into four groups (Measurement of Macroeconomic Variables; Aggregate Demand; Aggregate Supply and Growth; Fluctuations and Policy) was considered outdated by many advisors. Relying on extensive advice from Alan Blinder and suggestions by James Tobin and John Taylor, he proposed the following organization:

1. *General Aggregative Models (with entries for classical/Marxian/Sraffian, Keynesian and co., monetarists, new classical and forecasting models)*
2. *Production and Output Growth (including technological change and forecasting)*
3. *Consumption and Saving*
4. *Capital, Investment, Profit, and Rent*
5. *Labor and the Macro Economy (including employment and wage determination)*
6. *Price and Business Fluctuations*
7. *Money and the Macro Economy*
8. *Government and the Macro Economy*
9. *Macroeconomic Policy and General Outlook*

Macroeconomic Aspects of International Trade and Financial Economics were soon added to the list of subgroups. Maeshiro and Ekwurzel pointed out overlaps with other categories, in particular Money and Finance, Labor Economics, Public Finance, and International Economics, while Jerry Green objected that all economic articles would end up in Macroeconomics or Microeconomics if the category were to stay so large. The problem, Pencavel explained, was that "most macro courses touch on material that is taught in other courses (in micro,

[46] The difficulty in assembling a Macroeconomics category is consistent with its late appearance in the classification. However, Claveau and Gingras (2016), who analyze the changes in the structure of the discipline through bibliographic coupling, conclude that the resulting cluster associated with macroeconomic and monetary phenomena is the most stable over a period ranging from 1963 to 2010.

trade, money, public finance, labor, and so forth) so that, although there is a clearly defined core consisting of a system of equations describing the essential features of an aggregative economy, there is a wide penumbra of material neighboring on other fields [. . .] concerns about drawing the lines between macro and other classifications reflect very much the nature of the subject." The threat that Macroeconomics might become too large a category increased again when *JEL* board member Thomas Mayer, who oversaw the revision of the Financial Economics category, reported the widely shared opinion that its architecture was "lumping . . . two distinct classes of research—one that might be called Monetary Economics, and the other, more narrowly, Finance."[47] Monetary economics had always been classified in separate groups in previous classifications, and now it was not quite clear where it belonged. At that point, Macroeconomics encompassed entries on Measurement and Data, Money and Interest, Money Demand, and Money Supply, but Financial Economics was supposed to cover the literature on the nature of money and monetary standards, the theory of interest rates and their term structure, portfolio models, and central banking, among others. Following Campbell's remark that "monetary economics is now much more closely aligned with macro," Pencavel eventually moved monetary research into macro, consolidated consumption, production, employment, and investment into a single subgroup, and moved the international component of macroeconomics under International Economics, thereby giving Macroeconomics its final shape:[48]

E. Macroeconomics and Monetary Economics
General Aggregative Models
Consumption, Saving, Production, Employment, and Investment
Prices, Business Fluctuations, and Cycles
Money and Interest Rates
Monetary Policy, Central Banking, and the Supply of Money and Credit
Macroeconomic Aspects of Public Finance, Macroeconomic Policy, and General Outlook

4.3 *Integrating Theoretical and Applied Work*

The making of Microeconomics and Macroeconomics categories caused the disappearance of the Theory category, whose existence and content had been debated for half a century. Pencavel, Ekwurzel, and Maeshiro intended to go even further in the integration of theoretical and applied work. They were adamant "not to place the theoretical and empirical research in separate categories, but to integrate them." The justification for this approach, as Pencavel later wrote, was that "good research in economics is a blend of theory and empirical work and our procedure asks the author to make a choice when it comes to categorizing his work." Yet, the debates surrounding their project to abolish the theory heading illustrated that, in spite of the applied turn the profession had undergone since the 1970s, many economists still identified themselves as theorists.

[47] His advisors included Meir Kohn, Robert Shiller, James Poterba, John Campbell, Benjamin Friedman, Michael Jensen, John Long, René Stultz, and Michael Gibbons.

[48] From Box 904, folders "Log 1987/1," "Log 1987/2," "Log 1988," and "Log 1989": Maeshiro and Ekwurzel (hereafter M&E) to Pencavel, October 12, 1987, folder. Pencavel to M&E, October 2, 1988. Pencavel to Ekwurzel, March 1988. Pencavel to M&E, February 10, 1988; Pencavel to Ekwurzel, March 1988; Pencavel to M&E, October 2, 1988. Pencavel to M&E, July 21, 1988; M&E to Pencavel, September 2, 1988; Pencavel to M&E, September 14, 1988; Pencavel to M&E, April 19, 1990. John Pencavel, email to author, July 31, 2014. See also Pencavel (2014). Drucilla Ekwurzel, emails to author, August 23, 2014 and September 7, 2014.

Breaking with the previous organization, Maeshiro's Quantitative Methods and Models, for instance, initially omitted empirical work or data collection, leaving this research to be classified under the subject with which it dealt. Maeshiro's scheme was designed as a list flexible enough to accommodate rapidly changing econometric techniques, with Single Equation Models, Multiple/Simultaneous Models, Econometric Modeling, Mathematical Methods, Programming and Input–Output, Computer Programs, and Experimental Economics entries.[49] Richard Quandt agreed with the scheme, but wanted an additional subclass on statistical data. But once it was done, Lee Hansen found it odd that material on data was placed alongside Econometrics and Game Theory, and suggested the creation of a distinct major category called "Economic Data." Maeshiro and Ekwurzel retorted that "the methodology of data collection was an integral part of quantitative methods," but nevertheless changed the title of the subclass to Data Collection and Data Estimation Methodology.

In July 1988, Pencavel further reported that many colleagues still favored an organization whereby theoretical work would belong to the core, while empirical work would be classified in the field categories:

> People such as Blinder, Deaton, Houthakker, Riley, Sonnenschein, and Taylor support it [the merger between theoretical and empirical] while Davidson, Green, Kurz, and Pollak oppose it. I am sympathetic to Baumol's statement: "I think the merging of the theoretical and empirical studies is desirable if the reader will still be able to distinguish one from another." Deaton suggests a suffix code that distinguishes applied articles. My suggestion picks up on Pollak's proposal of putting theoretical and empirical articles of consumer and producer behavior in separate categories within Microeconomics.

Pencavel, Maeshiro, and Ekwurzel generalized this principle to most two-digit categories, which by the end of 1989 were formulated along the following lines:

> Consumption and Savings
> 3-0 General including measurement and data on consumption expenditures
> 3-1 Theory
> 3-2 Empirical Analysis
> 3-3 Forecasting

Sherwin Rosen and Richard Marston, the board members in charge of the revision of *Public Economics* and *International Economics*, respectively, had also explicitly advised that theory and empirical work be separated. Yet, as later pointed out by Houthakker, such an organization principle was running counter their initial integrative plan, so that by mid 1990s, the editors contemplated "rethink[ing] for the last time our extensive use of the 'theory' versus 'empirical analysis' distinction" out of a concern that "we may well be overdoing it." In a last move, they merged all their theory/empirical subclasses.

Yet another type of applied work required consolidation: policy analysis. Reflecting on the newly added Macroeconomic Policy subcategory, Maeshiro and Ekwurzel asked Pencavel whether this category was "for a theory of policy or policy actually taken." "If the former," they said, "then it is better to place in [Production or Growth] or [Money] . . . If it is for actual policies, wouldn't it be better in its subject category? If we don't want to separate theory and empirical analysis, why do we separate theory and policy?" This time, integration was not fully achieved. Several two- and three-digit categories—for instance Monetary Policy, Central Banking, and the Supply of Money and Credit (E5), Government Policy and Regulation (G38 in Financial Economics), or Government

[49] In the 1969 *JEL* classification, a subclass on "econometric, statistical, and mathematical methods and models" coexisted with another dealing with "economic and social statistical data and analysis."

Policy (H118 and H128 in Health Education and Welfare)—were added, after overlaps with Public Economics had been cleared.[50]

4.4 *Managing Field Demographics*

Because of the institutional visibility and intellectual status a *JEL* code was perceived to bestow upon a line of research, changing the classification of fields was perhaps the most sensitive part of the revision. Many economists believed that there was much at stake in the decision to place a field in its own top-level category and in where that category was placed (see table 3).[51]

In the first months of the revision, Economic History, Money and Finance, Welfare, Public Finance, Development Economics, and Spatial Economics gained independence. The ordering reflected no particular ranking, Pencavel insisted, except the desire to place neighboring fields adjacent to one another and to keep Microeconomics and Macroeconomics at the top.[52] On the other hand, the study of growth, which in the 1960s had been thought a separate field but, since then, had become central to macroeconomics, was subsumed into the Production subclass of Microeconomics, and was then placed alongside Economic Development and Technological Change to form a new category.[53]

The original list of categories was subsequently amended once, to accommodate a request by Harvard's Steven Shavell (see table 3). In December 1987, Shavell wrote Pencavel to point out that the Economics of Law and Crime subgroup in the Welfare category was inappropriately constructed. Designed in 1983 to deal mainly with the growing literature on the legal and economic aspects of antitrust and crime, it omitted subjects of importance. Notably, it failed to include such subjects as property, tort, contract law, and litigation. He thus recommended that the words "and Crime" be dropped from the category title. This request induced the editors to rethink the status of law and economics in the classification. They initially thought of placing the field under

[50] From Box 904: Quandt to Pencavel, June 28, 1998; Pencavel to AM&DE September 27, 1989; Pencavel to AM&DE, July 21, 1988; Ekwurzel and Maeshiro to Pencavel, October 31, 1989. From Box 905, folder "Log 90": Pencavel to AM&DE, April 19, 1990.

[51] The structure of each category was entrusted to a small number of specialists. Most were members of the *JEL* board of editors, including Blinder (Macroeconomics), Rosen (Public Economics), Marston (International Economics), Mayer (Financial Economics), Abramovitz and Alex Field (Economic History), and Duncan Foley (Economic Systems). Pencavel supervised the revision of the Labor and Demographic Economics section with Mark Killingsworth, the heterogeneous category spanning Health, Education, and Welfare was overseen by Robert Moffit, Roger Noll handled Industrial Organization, Glenn Nelson revised Development, Daniel Sumner reflected on Agriculture and Natural Resources, and Edwin Mills provided blueprints for the organization of Urban, Rural, and Regional Economics. John Siegfried modeled the first category, General Economics and Teaching, after the recommendations of the AEA Committee on Economic Education. Many other economists then commented on these preliminary drafts before Pencavel, Ekwurzel, and Maeshiro set about making them consistent. For instance, Pencavel consulted John Whitaker on the History of Economic Thought, and Richard Muth on Urban Economics. Email to author, July 31, 2014.

[52] In the course of the revision, he received several complaints that Economic History should be moved up with the methods, and that the existing ordering reflected the dominance of mathematics in economics. Pencavel refused on the grounds that he would have had to add Economic Development and Economic Systems, its neighboring disciplines, which would have positioned Microeconomics and Macroeconomics midway through the classification.

[53] This evolution also contrasts with the dynamics uncovered by Claveau and Gingras (2016) on bibliographic coupling. They document a high degree of connection between clusters in the late 1980s, at a time of specialty rearrangements, then a substantial decrease. Instead of an increase in the number of fields since the 1960s, they report a cluster downsizing, from twenty to fewer than ten. The reason for this is that labor, health, education, housing, and other topics usually found themselves in the same bibliographic cluster—one they call "applied microeconomics," whose focus changes across time. The cognitive proximity of many new *JEL* categories, measured by shared bibliographic references, thus contrasts with applied economists' aspiration for independence, recorded in the *JEL* codes evolution.

TABLE 3.
COMPARISON BETWEEN THE CLASSIFICATION SCHEMES USED IN 1986 AND 1991

1986 Classification	1991 Classification
0 General Economic Theory; History; Systems	A General Economics and Teaching
1 Economic Growth; Development; Planning; Fluctuations	B Methodology and History of Economic Thought
2 Quantitative Economic Methods and Data	C Mathematical and Quantitative Methods
3 Domestic Monetary and Fiscal Theory and Institutions	D Microeconomics
4 International Economics	E Macroeconomics and Monetary economics
5 Administration; Business Finance; Marketing; Accounting	F International Economics
6 Industrial Organization; Technological Change; Industry Studies	G Financial Economics
7 Agriculture; Natural Resources	H Public Economics
8 Manpower; Labor; Population	I Health, Education, and Welfare
9 Welfare Programs; Consumer Economics; Urban and Regional Economics	J Labor and Demographic Economics
	K Law and Economics
	I Industrial Organizations
	M Business Administration and Business Economics; Marketing; Accounting
	N Economic History
	O Economic Development, Technological Change, and Growth
	P Economic Systems
	Q Agriculture and Natural Resource Economics
	R Urban, Rural, and Regional Economics
	Z Miscellaneous

Industrial Organization, next to Economics of Regulation. After discussions with Stanford's Mitchell Polinsky, Shavell opposed such a scheme, pointing out that the subject matter of law and economics increasingly focused on property law, contract law, and the legal process, rather than business and competitive issues. The subject was more parallel in importance to urban economics, they emphasized, and merited similar status in the classification scheme. The editors eventually decided to create a new Law and

Economics major category and asked Shavell to provide a structure for it.

This move induced other economists to claim an independent category for their field. A Cultural Economics subclass was created under Z: Miscellaneous at Scott Farrow's request, but Marianne Felton felt that the dynamics of her specialty were comparable to that of urban economics (classified in Urban, Rural, and Regional Economics) and should consequently be given a major entry. In the spring of 1989, Gordon Tullock similarly wrote to complain that the editors' tentative plans were "downgrading" Public Choice, in the sense that it was buried into a few scattered third-level classes. Indeed, the editors had drawn on Dennis Mueller's Public Choice textbook to propose that three, three-digit entries be created inside Microeconomics to classify the new empirical analysis of voting, rent seeking, etc. Noll underlined that public-choice subject matters had little to do with traditional welfare analysis, but nevertheless encapsulated the work of about 5 percent of the profession. The relationship of this research to public economics was unclear. Part of the analysis of the political aspects of policy could certainly fit into this category, he explained, but then a similar section could as well be created for every other subject matter, from social security to defense programs. He thus advised that Pencavel set up a new Positive Analysis of Collective Decision Making section within Microeconomics, to cover Social Choice Theory, Theory of Teams, Economic Models of Political Processes, Bureaucracy, but also International Relations, and Positive Analysis of Micro and Macro Policies (of the Tabellini–Alesina type). He did not want to call the new section Public Choice ("to avoid association with the political views of Gordon and Jim Buchanan"), Political Economy (too Marxist), or Political Economics (a term he believed had wide currency only at Stanford and Caltech and might therefore sound parochial). He thus settled on Collective Decision Making, a wording that he took from the title of a book edited by Clifford Russell in 1979, and which he believed to be "rare" and "neutral" enough so that the many communities involved in the field would accept it. Although carefully crafted, this solution did not please everyone. Zane Spindler, from Simon Frazer University, thought that Public Choice had been forgotten and claimed that it deserved its own heading just as much as Law and Economics did. It was also felt already that environmental economics should have been given more space.[54]

Throughout this revision, the *JEL* editors faced the dual challenge of tracing the boundaries of the core categories and deciding which fields and approaches were large and institutionalized enough to warrant separate categories and which had to share top-level codes. The revision was driven by the needs of economists but this did not mean that the task was uncontroversial. It was, however, successful in that over the next twenty years, only incremental changes were needed: no new major category was created, though the title (and content) of category Q was amended to include Environmental and Ecological Economics. At the two-digit level, a fifth entry titled International Relations and International Political Economy was created under International Economics. Demand and Supply of Labor and Labor Standards: National and International were created inside Labor Economics, belatedly recognizing the changes that had taken place

[54] AM to Pencavel, January 22, 1988; Pencavel to Shavell, February 1, 1988; Box 904. Shavell to Pencavel, December 31, 1978; Shavell to Pencavel, March 14, 1988; courtesy, Steven Shavell; Felton to Ekwurzel, October 6, 1990; AM&DE to Pencavel, September 2, 1988; AM&DE to Pencavel, May 25, 1989; Pencavel, November 14, 1989, Box 904; Noll to Pencavel, June 4, 1989, courtesy, Roger Noll. Spindler to Maeshiro, June 11, 1991, Box 905. Kolstad to Maeshiro, November 13, 1991.

in this field, and Personnel Economics was added to the Business . . . category. Several subclass titles were expanded to make room for new themes such as knowledge, transitional economies, simulations, behavioral economics, and housing markets. These additions were usually suggested by "increasing usage of particular keywords by authors in EconLit" (Rousseau 2013).

5. *Conclusions*

It took eighty years, four major revisions, and several additional incremental changes for the American Economic Association to arrive at the *JEL* codes we use today. The process involved far more than simply observing the literature of economics and dividing it into fairly obvious categories. The notion of a core of micro and macro, central to the current classification, is of recent origin, and until this emerged, it was hard to achieve a consensus. Classifying economics stirred up methodological differences, such as over the role of economic theory as well as different views of the status of different applied fields. A major problem is that the classification has been aimed at classifying both economists and their output, and has been aimed not only at economists as researchers, referees, publishers, job applicants and recruiters, and conference attendees, but also at governmental bodies, natural scientists, funders, business recruiters, commercial publishers, librarians, and programmers. The codes have been the product of many forces, external demands, and visions of the discipline.

Each of the revisions had a different character, driven by a different combination of internal and external forces. In the first and third, external factors dominated but they operated in different ways. In the 1938–44 revision, the overriding factor was the need to classify economists who might be drafted into government service, and economists disregarded the classifications crafted for that particular purpose. In the 1966 revision, it was the NSF's requirements that combined with the demands of computerization and cost reduction. In contrast, the second and fourth revisions were driven by factors internal to the discipline, resulting in greater weight being attached to economists' views about how their discipline should be conceived. But here, too, there were differences. In the 1950s, economists were concerned about the status of their discipline and its public image, whereas in the 1990s the issue was providing a map with which to navigate a growing and rapidly changing discipline.

The last revision achieved a remarkable level of stability. For more than twenty years, the scheme designed under the leadership of Pencavel had accommodated the emergence of new subfields and methods. Recently, however, a new general revision of the *JEL* classification system has been discussed.[55] Given the role now played by the *JEL* codes, which is different from its role for much of the twentieth century, the most likely reasons to undertake a new revision would be the fragmentation of the discipline due to the emergence of new methods, and the disappearance of the core, on which the stability of the past twenty years was based. The lesson to be learned from past revisions is that if this happens, difficult methodological problems will have to be confronted and if there is no consensus on these, it will be difficult to create a system that lasts as well as the previous one. Account should also be taken of external pressures that are likely to arise, with the formalization of methods of research assessment and possibilities for bibliometric

[55] Minutes of the Executive Committee, January 3, 2013; Minutes of the meeting of the Executive Committee, April 12, 2013; Minutes of the meeting of the Executive Committee, January 2, 2014: https://www.aeaweb.org/AboutAEA/meeting_minutes.php.

analysis opened up by computerized databases of publications and researchers. Given that these are, to a significant extent, international, there might even be pressure to take into account the needs of economists outside the United States, something with which previous authors of the AEA's classification systems did not have to contend. Whatever the future holds, the discussions surrounding the *JEL* codes provide a window into the ongoing intellectual and institutional transformation of economics.

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