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Agricultural and Applied Economics: What is This?

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Abstract. The scientific domain of «agricultural and applied economics» is an open issue. In this paper, we analyse the JEL codes of the articles published in seven major agricultural economics journals in the period 2000-11, in order to define which disciplines and which research areas are the «core business» of today's agricultural and applied economists. A special attention has been given to the sub-sample of the Italian studies, since a new scientific society in this area (AIEAA) has been recently founded by a group of Italian economists.

Keywords. Agricultural economics, applied economics

JEL codes. A11, Q10

1. Introduction

The «Italian Association of Agricultural and Applied Economics» (AIEAA), the new scientific society of which this review is the official journal, has chosen a name that may look rather strange, at least at a first glance. One may ask: what is agricultural and applied economics? How is its scientific domain defined?

These are of course legitimate questions, which need an appropriate answer. It is well known that the founders of AIEAA have a long record of activity in the field of agricultural economics. Thus, why using two adjectives («agricultural and applied») to define its scientific domain? A first answer can be found in the AIEAA «mission statement»: a new scientific society related to the themes of agriculture and food is motivated by the radical change in the research objectives and in the methodologies characterizing the agricultural economics profession.

This reflection on the new research agenda of agricultural economists is not new and is common to most international scientific societies in this area. In the last few years, several presidential addresses of the major agricultural economics associations have tackled the issue of redefining the role of the profession in a changing environment (see among others: Kinsey, 2001; Thompson, 2001; Brandt, 2003; Leon, 2005; Buccola, 2006; Doering, 2007; Mittelhammer, 2009). This debate has led to some relevant changes: the most striking example is the *American Agricultural Economics Association*, which has recently redefined its mission statement and changed its name in *Agricultural and Applied Economics Association*. Thus, the new Italian association (whose name is clearly not brand new!) seems to be in line with an international trend that aims to redefine the research mission of agricultural economists.

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Why is this needed? It is well known that the role of agriculture in modern economic systems has radically changed: while its role as sector producing a key item for human life remains central, its share in terms of total value added and employment has become extremely small as compared to a few decades ago. The same is true for the role of agriculture in the food supply chain: the share of raw materials in the value of food items sold to final consumers is becoming smaller and smaller, since all services related to food production are gaining importance (processing, preparation, retailing, logistics, catering, marketing and communication…). This obviously means that studying the economic problems related to food means studying all the elements of the supply chain, their vertical relationships, and their relationships with the rest of the economy, both at the national and at the international level. Issues like competition and market power in the food supply chain, distribution of the valued added among agents, identification of the consumer needs, food safety and food quality are clearly at stake in the research agenda. The same is true for a range of issues having an international dimension, like world trade and prices of agricultural and food commodities or the contribution of agriculture and food production to economic development in the developing world.

Another area of new research potentials is the relationship between agriculture, food and the natural environment. The environmental sustainability of agricultural and food production, given the massive use of key resources like land and water, the new climate change challenges and the contribution of agriculture to the production of renewable energy are research themes that show the strict linkages between agriculture, food, resource use and environmental protection.

Thus, agricultural economists are facing new research challenges and an enlarged research agenda, which implies new methodological approaches, often interlinked with other scientific disciplines: from development economics to regional economics, from food technology to sociology, from management to industrial organization, from environmental and resource economics to energy economics. The objective of their research is also increasingly finalized to the definition of new public policies concerning the traditional areas of agriculture, food, trade and rural development, but also the new areas of environment and energy. Thus, the dialogue between researchers and policy-makers becomes another essential element of the profession.

The above considerations, largely elaborated by the AIEAA mission statement, are already a good rationale for enlarging the scope of a scientific society related to the themes of agriculture and food. Thus, the adjective «applied» has the role of synthesizing the interrelationships between traditional agricultural economics and a number of 'sister' disciplines. But nobody can deny that such adjective is rather vague and is not able to identify the key research trends in the 'enlarged' agricultural economics discipline.

In his presidential address, Mittelhammer (2009) has already discussed how it is difficult to identify the domain of «applied economics», since different definitions may apply. Nonetheless, comparing the content of a set of general economics vs. agricultural economics journals, he concludes that the diversified research interests of agricultural economists are perfectly in line with a broad definition of «applied economics», that he summarizes as follows (page 1174):

> It is a richly varied collection of approaches for analyzing real-world economic issues that encompasses all methods of analysis capable of being applied to economic data or issues, utilizes knowl-

edge of relevant history and institutions, and involves professional judgment, all of which is either combined with or guided by established economic theories or else transcends the existent body of economic theory and may contribute to and expand that body of theory.

Nonetheless, defining precisely which disciplines and which research areas are the «core business» of today's «agricultural and applied economists» remains an open issue. For this reason, this paper, building on the work of Mittelhammer (2009), analyses the content of the major agricultural economics journals, trying to identify the most relevant areas and trends in published research. A special attention is given to the contribution of researchers working in Italian institutions.

The paper is organized as follows: in section 2 we present the methodology and the data used in the analysis, in section 3 we discuss the results, while in section 4 we draw some conclusions.

2. Methodology and data

In order to identify research areas and recent trends in agricultural economics research, we have analysed the Journal of Economic Literature (JEL) codes of all articles published in the period 2000-2011 in some selected journals.

Most researchers in the broad field of economics are familiar with the JEL codes. This system classifies all research outputs in economics using a four-digit classification (American Economic Association, 2012). The first digit (alphabetical letters) defines twenty primary areas: the most important for agricultural economics is the area Q (Agricultural and Natural Resource Economics; Environmental and Ecological Economics). The second digit defines a general topic inside the primary area (for example Q1 stays for «Agriculture»), while the third digit defines a specific research area (for example Q18 stays for «Agricultural Policy; Food Policy»); the fourth digit is not used in the present system (it is 0 for all research areas), but is available for future refinements of the classification. In total, 804 codes are available. All pieces of economic literature available in the JEL online database *Econlit* (articles, books, book reviews, collective volume articles, working papers and dissertations) are classified with at least one JEL code, although it is very common that each item is classified with more than one code, in order to facilitate the online search.

In terms of journals, we have chosen to analyse seven major international agricultural economics journals: Agricultural Economics (AE); American Journal of Agricultural Economics (AJAE); Australian Journal of Agricultural and Resource Economics (AJARE); Canadian Journal of Agricultural Economics (CJAE); European Review of Agricultural Economics (ERAE); Food Policy (FP); Journal of Agricultural Economics (JAE).

Why this selection? The 2010 edition of the Web-of-Science (WoS) Journal Citation Report (JCR) includes 14 journals in the category «Agricultural Economics and Policy», but the above seven are by far the most important and the most relevant for the profession. In fact, they are included in the WoS database since its establishment, they are the first seven in terms of citation indexes (Impact factor and 5-year Impact factor), although their relative ranking has changed over the last few years. For example, FP has taken the lead as most cited journal in the field, thanks also to its more pronounced interdisciplinary nature; the citation indexes of the other journals tend to fluctuate over time, with a clear increasing

trend for all of them, except for the CJAE, which seems to have lost some appeal. Finally, all these journals, except FP, are official journals of one of the major scientific societies in agricultural economics: the International Association of Agricultural Economists (of which AE is the official journal), the European Association of Agricultural Economists (ERAE), the US Agricultural and Applied Economics Association (AJAE), the UK Agricultural Economics Society (JAE), the Canadian Agricultural Economics Society (CJAE) and the Australian Agricultural and Resource Economics Society (AJARE). Thus, they should closely reflect the evolution of the «core business« of the profession, since the members of the above societies consider their official journals as reference outlets for their research.

Of course, these seven journals do not cover the whole scientific production of agricultural economists, since their diversified research interests often lead them to publishes in specialised journals of other disciplines and sub-disciplines. This is probably the major limitation of the present analysis, which would be much more accurate if we could analyse publications of a selected number of authors that we can define «agricultural economists». Unfortunately, this type of authors' classification is not available in any bibliographic database, and, even if one has available a list of members of the major scientific societies in the field, carrying out a name by name search is likely to be an impossible task.

The second limitation is linked to how the JEL codes are chosen. Only a subsample of our seven journals (and, in general, of all economic journals included in *Econlit*) publish the JEL codes in the front page of each article; in this case, the JEL codes are chosen by the authors/editors and reflect their personal view of the topic(s) covered by the article. For all the other journals, the JEL codes are provided by the *Econlit* database managers, probably based on the content of the abstract and/or the keywords of each article. Thus, the classification is subjective and not homogenous among articles/journals, and this may lead to some inconsistencies. Moreover, since the main objective of *Econlit* is to facilitate the online search, there is no limit in the number of JEL codes attached to each article, and the order by which they are proposed does not imply any priority. Thus, each article cannot be uniquely classified in a given research area, namely a unique JEL code.

For this reason, in our analysis each article is counted as many times as its JEL codes, thus contributing to the share of all research areas for which it has been classified. Again, this may have created some imbalances in our results.

Finally, in some cases the JEL codes define a very specific research area, with no ambiguity, (i.e. Q22, defined as «Renewable Resources and Conservation: Fishery; Aquaculture»), while in other cases they define a very wide and comprehensive research area (i.e. Q18, defined as «Agricultural Policy; Food Policy»). This implies that the latter are used to classify very different type of articles, that often have very little in common in terms of objectives, methodology and results, even though they share the same code. Again, this may create some imbalances in the results, with some comprehensive JEL code being overrepresented.

In Table 1, we provide a classification of the articles considered in this analysis by journal and year. This data was downloaded at the beginning of September 2011, thus the last year is largely incomplete, especially for some journals, like the AJAE, for which data tend to be uploaded rather late in *Econlit*. Concentrating on the years 2000-10, for which all articles are available, one can clearly see that the total number of articles published each year in these seven agricultural economics journals has experienced a decline in the

Table 1. Total number of agricultural economics articles considered in the analysis

	AE	AJAE	AJARE	CJAE	ERAE	FP	JAE	Total
2000	53	118	22	49	25	43	27	337
2001	63	127	25	42	22	34	28	341
2002	29	124	26	35	25	33	33	305
2003	43	131	23	24	22	33	24	300
2004	46	127	24	22	24	37	29	309
2005	68	111	22	28	25	35	24	313
2006	71	105	31	38	23	40	33	341
2007	64	108	28	35	21	38	35	329
2008	76	107	28	22	25	61	30	349
2009	64	135	33	32	24	62	36	386
2010	72	96	35	30	23	66	34	356
2011*	38	14	25	22	20	75	37	231
Total	687	1303	322	379	279	557	370	3897

Source: Econlit
Note: the acronyms in each column represent the following journals: Agricultural Economics (AE); American Journal of Agricultural Economics (AJAE); Australian Journal of Agricultural and Resource Economics (AJARE); Canadian Journal of Agricultural Economics (CJAE); European Review of Agricultural Economics (ERAE); Food Policy (FP); Journal of Agricultural Economics (JAE).
*Incomplete

years 2002-05, and an increase in the most recent years. In fact, if one compares 2000 with 2010, several journals have experienced a significant increase in the number of published articles (AE +36%, AJARE +59%, FP +54% and JAE +26%), the ERAE has remained stable, while the two North American journals have experienced a sharp decrease (AJAE -19% and CJAE -39%). Despite this reallocation, the AJAE remains by far the leading journal in agricultural economics in terms of number of published articles, since it represents one third of all the articles considered in the analysis. AE and FP contribute respectively for 18 and 14% of the total articles, while the other four journals have a share ranging between 7 and 10%.

In Table 2, we present the number of articles with at least one author working in an Italian institution. Globally, the share of Italian articles is 1.9%, but such share is increasing over time: it is 1.3% in the 2000-05 period and it becomes 2.5% in the 2006-11 period. This trend is clearly encouraging, although, in absolute terms, the contribution of Italian researchers remains rather small.

3. Results

3.1 The most relevant research areas in agricultural economics

The classification of the 3,897 agricultural economics articles by their JEL codes is provided in Tables 3 and 4 and is expressed in terms of shares with respect to the corresponding totals. Of course, since each article carries more than one JEL code, it can be

Table 2. Number of agricultural economics articles with at least one author working in an Italian institution

	AE	AJAE	AJARE	CJAE	ERAE	FP	JAE	Total
2000	1	1		1	5		1	9
2001		1			1		1	3
2002		1			1			2
2003	1				2			3
2004		1				1	1	3
2005	1	1			1	1	1	5
2006		3			1			4
2007	1	2		1	2	1	1	8
2008		2		2		4	3	11
2009	3	2			3	2	1	11
2010					1	2	4	7
2011*	3				1	1	3	8
Total	10	14	0	4	18	12	16	74

Source: Econlit

Note: the acronyms in each column represent the following journals: Agricultural Economics (AE); American Journal of Agricultural Economics (AJAE); Australian Journal of Agricultural and Resource Economics (AJARE); Canadian Journal of Agricultural Economics (CJAE); European Review of Agricultural Economics (ERAE); Food Policy (FP); Journal of Agricultural Economics (JAE).

*Incomplete

counted several times and the sum of the shares is always higher than 1. Considering the whole sample, it turns out that, as expected, the most important JEL codes are those that have a rather general and comprehensive definition of the corresponding research area: 23% of the articles are classified as Q18 (Agricultural and food policy), 22% as O13 (Contribution of agriculture, natural resources and energy to economic development) and 21% as Q12 (Microeconomic analyses at the farm level). Thus, papers are almost equally distributed among these three categories, which represent the most important research areas in agricultural and applied economics.

Considering Q18 first, researchers in agricultural economics seem to have a special focus on problems related to government intervention in the agricultural and food sector. This is not surprising, since most countries, and especially developed countries, have a long history of intervention in this area, with a variety of instruments: from agricultural price support to direct payments to farmers, from traditional trade policies (tariffs and subsidies) to non-tariff barriers to trade, from food safety legislation to food quality promotion, from food labelling to animal welfare regulation. Thus, there is a wide set of studies that can potentially hit one or more of these issues.

Although for different reasons, it is also not surprising that many agricultural economics studies deal with the contribution of agriculture and some related sectors to economic development (O13): in developing countries the primary sector is still extremely relevant in terms of contribution to value added and employment, and can play a key role in development strategies. Finally, the third area of research by importance (Q12: micro-

Table 3. JEL codes of agricultural economics articles by journal, 2000-2011 (shares over the respective total in %)

		AE	AJAE	AJARE	CJAE	ERAE	FP	JAE	Total
Q18	Agricultural Policy; Food Policy	17.0	17.5	16.1	22.4	28.0	41.5	30.0	23.1
O13	Economic Development: Agriculture; Natural Resources; Energy; Environment; Other Primary Products	46.1	11.8	11.5	4.7	3.9	48.3	17.3	22.3
Q12	Micro Analysis of Farm Firms, Farm Households, and Farm Input Markets	32.9	16.5	17.7	15.3	26.5	16.9	28.6	21.3
Q16	Agricultural R&D; Agricultural Technology; Biofuels; Agricultural Extension Services	26.6	14.0	11.8	19.5	15.4	22.8	14.3	18.0
Q11	Agriculture: Aggregate Supply and Demand Analysis; Prices	19.5	15.6	9.9	14.0	14.7	18.7	13.0	15.8
Q13	Agricultural Markets and Marketing; Cooperatives; Agribusiness	11.2	13.3	7.5	22.2	16.8	16.9	10.8	13.8
Q17	Agriculture in International Trade	10.2	7.8	8.7	16.4	15.1	10.1	12.2	10.4
Q15	Land Ownership and Tenure; Land Reform; Land Use; Irrigation; Agriculture and Environment	13.1	7.1	18.9	11.1	7.5	5.7	12.2	9.9
D12	Consumer Economics: Empirical Analysis	6.1	7.7	5.3	8.7	13.6	11.5	8.6	8.4
L66	Food; Beverages; Cosmetics; Tobacco; Wine and Spirits	5.8	5.0	2.8	12.9	12.9	12.6	8.1	7.7
O15	Economic Development: Human Resources; Human Development; Income Distribution; Migration	7.9	3.8	1.9	0.5	1.1	18.7	2.2	5.8
F13	Trade Policy; International Trade Organizations	3.1	4.1	4.7	9.5	9.0	5.9	8.1	5.5
Q25	Renewable Resources and Conservation: Water	4.7	3.2	16.8	7.9	2.5	1.4	2.2	4.6
O18	Economic Development: Urban, Rural, Regional, and Transportation Analysis; Housing; Infrastructure	10.6	1.7	1.9	1.1	0.0	9.5	3.0	4.3
D18	Consumer Protection	1.5	3.0	0.6	4.0	5.4	12.2	3.2	4.1
P32	Collectives; Communes; Agriculture	6.8	2.0	3.1	2.6	3.6	7.0	2.7	3.9
D24	Production; Cost; Capital, Total Factor, and Multifactor Productivity; Capacity	6.8	3.0	5.6	2.1	5.0	0.7	4.9	3.8
I12	Health Production	2.3	3.0	0.0	1.1	2.5	13.8	0.8	3.7
Q28	Renewable Resources and Conservation: Government Policy	3.2	3.5	12.1	2.9	3.9	0.4	3.5	3.7
Q58	Environmental Economics: Government Policy	1.3	3.4	10.9	6.1	3.6	0.5	4.9	3.6
Q14	Agricultural Finance	3.8	5.4	1.6	5.3	2.5	0.5	2.7	3.6
O19	International Linkages to Development; Role of International Organizations	4.4	2.3	0.6	2.1	3.6	7.0	3.0	3.3
Q22	Renewable Resources and Conservation: Fishery; Aquaculture	1.2	4.2	5.6	1.6	3.9	2.7	3.8	3.3
Q24	Renewable Resources and Conservation: Land	4.1	3.2	4.3	2.6	2.2	0.9	3.8	3.1
F14	Country and Industry Studies of Trade	3.1	2.5	2.2	4.5	2.9	2.9	3.0	2.9
I32	Measurement and Analysis of Poverty	4.4	1.9	1.6	0.0	1.1	6.8	0.5	2.6

Source: Econlit

Note: the acronyms in each column represent the following journals: Agricultural Economics (AE); American Journal of Agricultural Economics (AJAE); Australian Journal of Agricultural and Resource Economics (AJARE); Canadian Journal of Agricultural Economics (CJAE); European Review of Agricultural Economics (ERAE); Food Policy (FP); Journal of Agricultural Economics (JAE).

Table 4. JEL codes of agricultural economics articles by year, 2000-2011 (shares over the respective total in %)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	Total
Q18	Agricultural Policy; Food Policy	18.7	22.9	22.3	23.0	21.7	26.2	26.1	24.0	22.3	24.9	23.9	20.8	23.1
O13	Economic Development: Agriculture; Natural Resources; Energy; Environment; Other Primary Products	23.7	25.8	21.0	22.7	21.7	17.6	21.1	22.8	24.6	22.0	21.1	23.8	22.3
Q12	Micro Analysis of Farm Firms, Farm Households, and Farm Input Markets	10.4	18.5	19.0	15.7	22.3	25.2	24.6	22.8	18.6	28.8	25.6	22.9	21.3
Q16	Agricultural R&D; Agricultural Technology; Biofuels; Agricultural Extension Services	13.4	16.4	16.4	22.7	20.1	16.6	18.2	23.4	19.2	16.1	18.0	15.6	18.0
Q11	Agriculture: Aggregate Supply and Demand Analysis; Prices	20.8	14.7	17.0	12.3	11.0	15.0	14.1	14.3	19.8	13.0	19.9	17.3	15.8
Q13	Agricultural Markets and Marketing; Cooperatives; Agribusiness	15.4	13.8	11.5	10.7	12.6	10.9	9.7	14.0	12.9	21.0	14.9	18.2	13.8
Q17	Agriculture in International Trade	13.6	14.1	15.1	8.0	6.8	8.0	10.3	10.0	9.7	9.8	11.2	6.5	10.4
Q15	Land Ownership and Tenure; Land Reform; Land Use; Irrigation; Agriculture and Environment	7.1	7.3	8.5	7.7	10.7	9.6	11.7	10.0	10.6	10.4	10.7	15.2	9.9
D12	Consumer Economics: Empirical Analysis	3.6	6.5	5.2	8.7	6.1	8.6	5.6	5.5	12.6	10.4	11.5	18.2	8.4
L66	Food; Beverages; Cosmetics; Tobacco; Wine and Spirits	3.0	3.8	3.9	5.7	4.2	9.9	11.4	7.9	8.3	10.4	11.0	13.0	7.7
O15	Economic Development: Human Resources; Human Development; Income Distribution; Migration	7.1	6.7	4.9	5.0	6.5	7.3	7.0	5.5	6.6	4.7	2.8	5.6	5.8
F13	Trade Policy; International Trade Organizations	4.7	4.7	8.9	6.0	4.2	5.1	7.3	3.3	6.0	5.7	6.5	2.6	5.5
Q25	Renewable Resources and Conservation: Water	6.8	4.7	5.6	4.7	2.6	2.6	5.3	3.6	5.4	3.6	5.6	5.2	4.6
O18	Economic Development: Urban, Rural, Regional, and Transportation Analysis; Housing; Infrastructure	2.7	3.8	1.0	2.0	5.2	5.4	7.0	7.3	5.2	4.7	3.1	4.3	4.3

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011*	Total
D18	Consumer Protection	2.7	2.1	2.3	2.0	5.5	7.7	4.4	5.2	6.0	4.1	3.1	4.8	4.1
P32	Collectives; Communes; Agriculture	6.2	3.5	4.6	2.3	1.6	5.4	3.2	4.0	4.0	5.4	3.1	2.6	3.9
D24	Production; Cost; Capital, Total Factor, and Multifactor Productivity; Capacity	2.7	1.8	3.6	2.7	2.3	4.2	5.3	5.8	2.3	3.6	6.2	5.6	3.8
I12	Health Production	1.2	2.3	1.6	2.7	1.9	5.1	2.6	4.6	6.9	2.6	5.9	8.7	3.7
Q28	Renewable Resources and Conservation: Government Policy	5.0	5.3	6.2	4.0	1.0	3.2	3.5	4.0	4.3	3.1	2.5	1.7	3.7
Q58	Environmental Economics: Government Policy	0.0	0.0	0.0	2.3	7.1	3.5	4.7	3.3	6.6	4.4	6.7	4.8	3.6
Q14	Agricultural Finance	5.0	4.4	4.6	3.7	3.2	2.2	1.8	3.3	4.9	5.4	2.5	1.3	3.6
O19	International Linkages to Development; Role of International Organizations	3.3	5.0	3.9	2.3	2.6	2.6	3.2	3.0	4.0	3.9	4.5	0.4	3.3
Q22	Renewable Resources and Conservation: Fishery; Aquaculture	4.7	4.1	3.6	2.3	2.9	2.2	3.8	2.4	3.2	2.3	4.2	3.0	3.3
Q24	Renewable Resources and Conservation: Land	1.2	3.5	3.6	2.3	5.8	3.5	2.9	3.0	5.7	2.8	1.4	0.0	3.1
F14	Country and Industry Studies of Trade	3.6	1.2	2.0	1.0	2.9	2.9	3.8	0.9	3.2	5.4	5.1	1.3	2.9
I32	Measurement and Analysis of Poverty	5.0	3.2	0.7	2.3	1.3	4.2	2.1	1.5	3.7	1.6	3.1	3.0	2.6

Source: Econlit
*Incomplete

economic analyses at the farm level) can be considered the evolution of traditional agricultural economics, since researchers have always dedicated a special attention to the specificities of agricultural production (price volatility, weather risk, biological cycles,…) and of the organisation of the farm business.

Other relevant research areas for agricultural economists, interesting more than 10% of the articles, are:

1. agricultural technology, research and extension (Q16), in which the new topic of agricultural commodities cultivated for biofuel production plays a key role;
2. demand, supply and market price analysis (Q11), in which researchers address issues like demand and supply elasticities as well as commodity price volatility;
3. agriculture in international trade (Q17), where trade policies (tariffs, subsidies, sanitary and phytosanitary measures,…) are studied, with a special focus on the role of agriculture in international trade negotiations in the World Trade Organization (WTO) context;
4. agricultural and food markets and marketing (Q13), in which a special attention is given to the functioning of the food supply chain and the industrial organisation analysis of the different actors of the chain (farmers, processors, retailers).

However, one should not just look at the most relevant research areas in terms of shares of total articles, mainly for two reasons: first, this ranking may be biased by the wide definition of some JEL codes (see above); second, and more important, some 'niche' areas, interesting a lower share of articles, may reveal new topics and new trends that are gaining importance. If one considers all the JEL codes reported in Tables 3 and 4 (all those interesting at least 2.5% of the articles considered in this paper), one of the most interesting elements is the presence of research areas outside the area Q, which is by definition the area of agricultural economics. Among these research areas, the most important is by far the area O13 (contribution of agriculture to economic development), which has been discussed before. The second one by importance is D12 (consumer economics), since researchers are dedicating an increasing attention to the analysis of factors influencing consumers' choices for food products. The third one is L66 (food and beverage industry), which includes all industrial organization studies concerning the food industry; this JEL code is often linked with Q13, the code specific to supply chain studies in the area Q.

This kind of linkages between codes in area Q and codes in other JEL research areas are relevant also for production studies (Q12 and D24, the specific code for efficiency and productivity studies), demand studies (Q13 and D12) and trade studies (Q17 and F13, the code related to international trade organizations). On the contrary, the linkages between agriculture and other sectors of the economy tend to be classified in areas outside Q, like O15 (role of human resources, migration, and income distribution for economic development) and O18 (relationship between urban and rural areas, regional economics, transportation and infrastructures). Finally, studies very specific to the agricultural sector are those related to land use, that are classified under Q15, and to water use (Q25), the most important environmental JEL code that we find among agricultural economics articles.

3.2 The JEL codes by journal

In Table 3, the JEL codes of agricultural economics articles are disaggregated by journal, and one can easily appreciate that there are strong differences among journals in terms of the relative weight of the most represented research areas.

Starting from the AJAE, the most important journal in terms of number of published articles, one can note that, while the ranking of the different areas is in line with the totals, their shares tend to be significantly smaller. This is true for almost all JEL codes considered in Table 3, which means that the articles published in the AJAE tend to cover a wider spectrum of topics, although many of them have a low share and can be considered as 'niche' research areas. Some relevant differences with respect to the whole sample concern the area O13 (agriculture and economic development), which is rather under-represented, and the area Q14 (agricultural finance), to which the AJAE dedicates more space than all the other journals.

The two European journals, the ERAE and the JAE, have a similar profile, with a strong emphasis on agricultural and food policy (Q18) and on the microeconomic analyses at the farm level (Q12). These two codes are often linked together, especially when the articles address issues related to the Common Agricultural Policy (CAP) of the European Union (EU), whose role is extremely relevant for the farm business in Europe. Other areas that are intensively covered in these two journals are trade policies and industrial organization of the food industry, as well as consumer economics (mainly in the ERAE) and land use studies (mainly in the JAE).

The two journals with a stronger international focus, AE and FP, also have a similar profile, with a strong emphasis on articles dealing with the relationship between agriculture and economic development (O13), the issues related to agricultural technology, R&D and biofuels (Q16), as well as on agricultural market and price analyses (Q11). FP is also strongly focused on agricultural and food policies, while AE hosts many studies concerning microeconomic analyses at the farm level.

The two remaining journals, AJARE and CJAE tend to be rather focused on national problems; however, in terms of topics, the former frequently hosts articles dealing with environmental economics and policies, while the latter is especially targeted to trade and supply chain issues.

Now the question is: are these differences the results of specific editorial policies? It is of course difficult to answer this question. In general, all the seven journals analysed here have recently revised their «aims and scope», typically enlarging the list of their topics of interest. Thus, all these journals are diversifying their content, although the actual composition is clearly related to the outcome of the peer review process and its impact on the potential submissions, since authors tend to submit in journals where they have already found some related articles.

3.3 The JEL codes over time

Given the objectives of this analysis, the evolution of the JEL codes of agricultural economics articles is clearly a key issue, since it allows us to identify positive or negative trends in terms of research topics. Focusing first on the main research areas discussed in

section 3.1, at the beginning of the period the topics related to agriculture and economic development were by far the most relevant in agricultural economics journals. Over time, we observe a strong increase in the share of agricultural and food policy articles, which peaked in 2005-06, and slightly declined in the last few years. This is likely to be linked with the major agricultural policy reform processes that took place in the years 2002-2005 in several developed countries, which generated a relevant flow of articles analysing their impact. Since we expect another relevant wave of reforms in the near future, this is likely to happen again in the next few years. As discussed above, these articles are often developed through microeconomic analyses carried out at the farm level. This is probably one of the reasons linked to the trend of the corresponding JEL code (Q12), which follows rather closely that of Q18: a strong increase till the years 2005-06 and a slight decline in the last few years. A similar trend characterises also the articles dealing with agricultural technology, R&D and with the issue of biofuels. This is not surprising, since the debates on Genetically Modified Organisms (GMOs) and on the use of agricultural raw materials for producing renewable energy has been especially hot in the middle of the decade, and, as for the policy issues, are likely to come back again in the near future.

Some other important JEL codes show the opposite pattern: a decline in the middle of the period and a recovery in the last few years. This is the case, for example, of research areas like market and price analysis and industrial organisation of the food sector. The recent interest in these areas is clearly linked to the dramatic increase in commodity price volatility and to the consequences of the economic crisis. In this context, issues like the transparency of food pricing, the market power of food processors and retailers and the distribution of the value added along the supply chain are becoming increasingly important.

The research area that shows the sharpest increase over time is the empirical analysis of consumer preferences (JEL code D12). This is due to the development of research tools in experimental economics and choice modelling dealing with consumer preferences for food, as well as to the increasing importance of issues related to the linkage between food and health, like obesity or functional foods. In this area, agricultural economists are playing a leading role in terms of addressing these hot empirical issues.

Finally, the share of the articles linked to environmental economics and policy tends to fluctuate over time, with a clear increasing trend only for the research area related to land use, irrigation and the relationship between agriculture and the environment (Q15).

3.4 The contribution of Italian studies

Table 5 presents the JEL codes of the agricultural economics articles with at least one author working in Italian institutions. Given the rather low number of articles, we have grouped the articles in two sub-periods. As compared to Table 4, two of the most relevant research areas are the same as in the general sample: agricultural and food policies (Q18) and microeconomic analyses at the farm level (Q12). Once again, these two JEL codes are often linked to the same article, and their sharp increase over time clearly shows an increasing interest by Italian studies in this wide research area.

The rather high share of articles dealing with trade problems and policies (Q17 and F13) is a rather peculiar feature of Italian studies. This is likely to be linked with the presence of a group of very active Italian researchers, with a strong reputation in this field,

Table 5. JEL codes of Italian agricultural economics articles (shares over the respective total in %)

		2000-05	2006-11	Total
Q18	Agricultural Policy; Food Policy	16.0	34.7	28.4
Q17	Agriculture in International Trade	28.0	24.5	25.7
Q12	Micro Analysis of Farm Firms, Farm Households, and Farm Input Markets	16.0	24.5	21.6
F13	Trade Policy; International Trade Organizations	20.0	20.4	20.3
D12	Consumer Economics: Empirical Analysis	20.0	18.4	18.9
Q13	Agricultural Markets and Marketing; Cooperatives; Agribusiness	16.0	18.4	17.6
Q16	Agricultural R&D; Agricultural Technology; Biofuels; Agricultural Extension Services	20.0	14.3	16.2
O13	Economic Development: Agriculture; Natural Resources; Energy; Environment; Other Primary Products	0.0	24.5	16.2
L66	Food; Beverages; Cosmetics; Tobacco; Wine and Spirits	12.0	14.3	13.5
P32	Collectives; Communes; Agriculture	0.0	10.2	6.8
D18	Consumer Protection	12.0	4.1	6.8
Q11	Agriculture: Aggregate Supply and Demand Analysis; Prices	4.0	8.2	6.8
D24	Production; Cost; Capital, Total Factor, and Multifactor Productivity; Capacity	8.0	4.1	5.4
O19	International Linkages to Development; Role of International Organizations	0.0	6.1	4.1
J43	Agricultural Labor Markets	8.0	2.0	4.1

Source: Econlit

that have proposed some significant contributions to the literature. The same happens for consumer economics studies, whose share is well above the average of the general sample, since again a group of Italian researchers is very active in this area. Italian studies are well represented also in the areas related to the industrial organisation and supply chain analyses of the food sector (Q13 and L66), while their contribution is rather marginal, as compared to the general sample, in areas like price analysis (Q11) and agriculture and economic development (O13). Finally, one the most striking evidences concerning Italian studies is their virtual absence from all areas concerning environmental economics and policies. Of course, this conclusion is subject to all qualifications mentioned in section 2, since, for example, agricultural economists interested in environmental issues tend to publish in specialised journals, mainly for two reasons: a) there are several specialised journals related to environmental and natural resource economics; b) some agricultural economists are leaders in topics related to the relationships between agriculture, food and the environment.

4. Concluding remarks

This paper has analysed the JEL codes of the articles published in the period 2000-11 in seven major agricultural economics journals, in order to define which disciplines and which research areas are the «core business» of today's agricultural and applied economists. A spe-

cial attention has been given to the sub-sample of the Italian studies, since a new scientific society in this area (AIEAA) has been recently founded by a group of Italian economists.

The results concerning the general sample confirm the wide spectrum of interests of agricultural and applied economists, that includes some rather diversified research areas: from agricultural and food policies to the microeconomics of farmers' behaviour, from development issue to commodity market and price analysis, from the industrial organisation of the food sector to agricultural technology, innovation and research, from agri-environmental economics and policy to consumer behaviour, from trade problems to water and land use issues. In general, this wide spectrum of interests is in line with the definition of applied economics recently proposed by Mittelhammer (2009) as the mission of the AAEA, the recently renamed US society of agricultural and applied economists. Of course, this 'enlarged scope' of research in agricultural and applied economics also implies a new working style of researchers, in which the collaboration and integration with several related disciplines, the adoption of new research methodologies and a close dialogue with the policy makers become increasingly important.

Now the question becomes: is this retrospective analysis sufficient to define future research trends in agricultural and applied economics? Answering this question is very difficult, for a number of reasons. The most important one is that, given the timing of the peer review process, there is already a significant lag between paper submission and publication, ranging, on average, between 1 and 2 years. This means that the research output we observe in scientific journals is likely to be linked to ideas and projects developed several years before, while any article related to today's hot topics in terms of social demand and/or policy relevance is likely to be published within the next 2-3 years. Thus, for example, it is very likely that articles covering issues like agricultural policy reform in the EU or commodity price volatility will increase in the near future. Nonetheless, other areas in which we should expect an increasing attention are those related to methodological improvements. For example, based on the JEL codes analysed in this paper, areas in which research is likely to be very active are, among others, farmers' behavioural modelling, vertical relationships in the food supply chain, price transmission mechanisms, econometric analysis of farm level data, policy evaluation modelling, experimental economics and consumers' choice modelling. This list, although not exhaustive, may be considered a starting point for the future research agenda in agricultural and applied economics.

The above general approach to the agricultural and applied economics profession as well as the most promising research trends are well developed also in the mission statement of the AIEAA, whose scopes seem in line with the trend of the other major scientific societies in the field. This should become a strong incentive for Italian agricultural and applied economists wishing to play a role in the international arena. In fact, the analysis concerning Italian studies has shown that, while in terms of topics they are fairly in line with the general international trend in published research, their quantitative contribution remains rather small (only 2.5% of the published articles in the last 6 years), despite an encouraging increasing trend. This is clearly an important problem for the Italian agricultural and applied economics profession, which should dedicate some of its research and training efforts to develop the capacity of publishing a higher number of articles in international peer reviewed journals, especially through its younger members. This seems to be one of the most important missions of the newly founded AIEAA.

Finally, one should bear in mind that this analysis carries some important limitations, discussed in section 2. The most important one is certainly the fact that agricultural and applied economists, given their diversified research interest, publish also in journals that are not included in the ISI category «Agricultural economics and policy», whose domain is also rather ambiguous (for example, in the well-known database «Scopus», no category of this type exists). This makes our analysis incomplete by definition, and further research efforts aiming to include a broader spectrum of journals would certainly be valuable.

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