Twenty years of research on transition in agricultural economics journals

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Abstract

We analyse topics and authorship networks in articles on agricultural transition that were published in 16 subject-related peer-review journals between 1989 and 2008. Increasingly, articles on transition are written by authors from the European Union-15 in collaboration with authors from Central and Eastern Europe countries. The importance of authors from North America has fallen since the mid-1990s, and authors from Former Soviet Union countries have not made a large contribution to the literature. A group of roughly 10 authors plays a central role in the literature on agricultural transition, which has become increasingly method-driven and less descriptive or issue-driven over time. The co-authorship network for transition articles is characterised by a predominance of individuals or small groups of authors who have published only one or two papers.

Keywords: research, publication, co-authorship, network analysis

JEL classification: A11, A14, P20, Q10

1. Introduction

After two decades of political and economic transition in Central and Eastern Europe (CEE) and the Former Soviet Union (FSU), many groups that have been affected by or engaged in this process are engaging in stocktaking exercises. Agricultural economics as a profession is no exception. Recently, several agricultural economic conferences such as the joint Seminar of the International and the European Associations of Agricultural Economists (IAAE/EAAE) documented in Csáki and Forgács (2008), and the Institut für Agrarentwicklung in Mittel- und Osteuropa Forum for which this paper has been written, have included reflective by-lines in their titles ('what was expected?', 'what has been achieved?' and 'where are we heading?').

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All figures in this article are available in colour online at *ERAe* online.

The desire to take stock is understandable. The onset of transition marked a shift in global proportions; for hundreds of millions of individuals, it was an event of singular importance. Since economic issues were central to the transition process as a whole, and since agriculture was a key sector in the economies of many transition countries, agricultural economists were asked to analyse, diagnose and prescribe. The profession responded, shaping the transition process, and being shaped by it. Did we provide useful analysis and advice? Was this advice followed and, if not, why not? Did we take advantage of the unique opportunities and ‘natural experiments’ provided by transition to further our understanding of economic processes and interactions?¹

The performance of our profession in connection with transition can be assessed in different ways. In this paper, we study articles on transition in international journals in the field of agricultural economics to gain some insights into this performance. Specifically, we analyse topics, authors and co-authorship networks in the articles on transition that have been published in 16 peer-review international journals in agricultural economics and transition economics between 1989 and 2008.

To focus on journal articles is to take a partial and self-referential perspective. In the world of policy and economic decision-making, other vectors of agricultural economic influence are likely to have played a more important role than our refereed articles. In particular, hundreds of papers produced by agricultural economists with and for organisations such as the EBRD, the European Commission and the World Bank have been influential, often directly affecting outcomes such as loans, legislation and accession. Our success or failure in educating a new generation of agricultural economists who are equipped to address future challenges in the transition countries is also a key measure of performance.

Journal articles can nevertheless provide useful insights into our performance as a profession. Journal articles are a vital component of the academic incentive system; tenure and funding decisions are largely and increasingly driven by an individual’s or institution’s success in generating such publications. Hence, journal articles reflect what the individuals and institutions at the cutting edge of the discipline are thinking and doing. As many journal articles are the result of PhD and post-doc research, they also reflect the topics and tools that are being emphasised in agricultural economic capacity building. A number of insightful analyses of the performance of agricultural economics in connection with transition have been published (e.g. Csáki, 2008; Koester, 2008). But, to our knowledge, there has so far been no systematic attempt to review the agricultural economics journal literature on transition to assess who is publishing, what they are publishing and how the answers to these questions have changed over the last 20 years.

1 Stocktaking on transition also takes place against a background of more general reflection on the relevance and future of agricultural economics as a distinct branch of science – see e.g. Perry (2007).

2. The sample of transition articles in agricultural economics journals

The analysis of publications and author networks in the economics of agricultural transition literature is based on a dataset drawn from a list of 16 peer-review journals (Table 1). This list includes all nine of the agricultural economics journals that are included in the Journal Citation Reports produced by Thomson ISI (*Agricultural Economics*, the *American Journal of Agricultural Economics*, the *Australian Journal of Agricultural and Resources Economics*, the *Canadian Journal of Agricultural Economics*, the *European Review of Agricultural Economics*, *Food Policy*, the *Journal of Agricultural Economics*, the *Journal of Agricultural and Resource Economics* and the *Review of Agricultural Economics*) as well as five other agricultural economics journals that have a broad international circulation (*Agribusiness*, the *International Food and Agribusiness Management Review*, the *Journal of International Agricultural Trade and Development*, the *Quarterly Journal of International Agriculture*, and *Outlook on Agriculture*). It also includes two journals that cover transition economics in general (*Eastern European Economics* and the *Economics of Transition*) and occasionally include papers specifically on agricultural issues.

The resulting list of journals is clearly subjective, but we are confident that we cover a comprehensive and representative portion of the journal landscape that is relevant to internationally active agricultural economists. We decided not to include national journals – such as the German *Agrarwirtschaft* – because a representative list of these journals would be very long, and not all these journals follow standard peer-review processes. Furthermore, coding and evaluating articles in a wide variety of foreign languages would have required an even greater effort than was already required for the 16 journals considered here.

An earlier draft of this paper (available from the authors) considered only 11 journals, the 9 covered by Thomson ISI's Journal Citation Reports as well as *Agribusiness* and the *Quarterly Journal of International Agriculture*. The additional five journals considered in this paper were included in response to suggestions that we should capture a broader spectrum of agricultural economic research, including management issues (e.g. the *International Food and Agribusiness Management Review*) and journals that more commonly publish papers by authors from the transition countries (e.g. *Eastern European Economics*). However, a comparison of this with the earlier version of the paper reveals that expanding the set of journals has no substantial impact on the main results and conclusions.

We searched all issues of the 16 selected journals between 1989 and 2008 for relevant articles. Depending on the journal in question, more recent years were searched on-line while earlier years had to be searched using hardcopy collections. All documents that included a reference to transition, CEE, the FSU or any individual country in either of these regions in their titles, abstracts or keywords were selected. Countries up to and including Mongolia were

Table 1. The sample of peer-reviewed journal articles on agricultural transition (1989–2008)

Year	Journal															Total
	Agr Econ	Am J Agr Econ	Can J Agr Econ	Eur Rev Agric Econ	Food Policy	J Agr Econ	J Agr Resour Econ	Rev Agr Econ	Agribusi-ness	Q J Int Agr	E Eur Econ	Outlook Agr	Econ Transit	J Int Agr Trade Dev	Int Food Agr Bus Rev	
1989	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
1990	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1991	0	0	0	4	8	0	0	0	0	1	0	0	0	0	0	13
1992	1	6	0	0	0	0	0	0	0	0	1	0	0	0	0	8
1993	1	3	1	0	1	0	0	0	0	1	0	0	3	0	0	10
1994	0	3	0	5	1	0	0	0	2	0	2	0	1	0	0	14
1995	3	1	0	1	2	0	0	1	3	0	2	0	0	0	0	13
1996	1	5	0	1	0	0	0	0	0	4	1	0	0	0	0	12
1997	0	1	0	2	1	0	0	2	0	1	0	0	0	0	0	7
1998	0	1	0	8	3	0	0	3	0	3	1	0	1	0	2	22
1999	1	0	1	4	1	1	0	0	2	3	2	0	1	0	0	16
2000	4	2	0	0	8	2	0	0	0	1	0	0	0	0	0	17
2001	2	2	0	4	1	1	0	0	1	6	5	0	0	0	0	22
2002	0	4	0	0	0	0	1	1	0	0	0	0	0	0	0	6
2003	2	2	0	0	0	1	0	0	1	0	3	0	0	0	1	10
2004	2	0	1	1	1	1	1	0	1	7	1	0	0	0	0	16
2005	9	0	0	0	2	2	0	2	1	0	4	1	0	0	0	21
2006	1	1	0	1	1	1	0	0	1	1	2	0	0	0	0	9
2007	2	2	0	0	1	1	0	0	1	1	4	1	0	1	1	15
2008	0	0	1	2	2	2	0	0	0	0	1	0	0	1	1	10
Total (share %)	29 (11.9)	35 (14.3)	4 (1.6)	33 (13.5)	34 (13.9)	12 (4.9)	2 (0.8)	9 (3.7)	13 (5.3)	29 (11.9)	29 (11.9)	2 (0.8)	6 (2.5)	2 (0.8)	5 (2.0)	244 (100)

Source: Own compilation.

considered; China and Vietnam were not. Removing book reviews, comments and replies, discussions (for example of plenary papers in the proceedings issue of the *American Journal of Agricultural Economics*), introductions to special issues and some special features (for example ‘Viewpoints’ and ‘Industry Notes’ in *Food Policy*) produced a sample of 244 articles on transition in agricultural economics journals.

Table 1 provides an overview of the journals considered, and the number of relevant articles in each journal and year. As the survey revealed no relevant articles in the *Australian Journal of Agricultural Economics*, this journal is not considered further. Each article in the sample was coded according to a variety of criteria such as year of publication, number of authors, identity and origin of authors, and the topic and country or countries it deals with.

3. Analysis and results

3.1 The number and share of articles on agricultural transition and the role of individual journals

In the first decade after 1989, there was a rapid increase in the number of articles on transition in the sampled journals, which peaked at 22 articles in 1998 and 2001 (Figure 1). Since this time the number of articles has tended to fall, although it fluctuates considerably and reached 21 articles in 2005. Based on the development of the number of articles published each year, the overall interest in agricultural transition topics would appear to be waning somewhat, or at least to be levelling off following growth in the course of the 1990s.

Fig. 1. Number and share of articles on transition in the sampled journals (1989–2008).
Source: Own calculations.

As the total number of articles published in the surveyed journals each year has fluctuated between 400 and 460, the share of articles on agricultural transition topics in the total number of published articles has evolved very much in parallel with their absolute number (Figure 1). The share of the total number of articles published in the sampled journals in a year that deal with transition topics peaked at slightly over 5 per cent in 2001, and the average share over the entire sample period is 2.8 per cent. To put this in perspective, the share of articles dealing with China over the same sample of journals and years is roughly 2 per cent.

Six of the 16 journals in the sample together account for just over three-quarters of the total number of transition articles, and the remaining journals account together for the remaining roughly one-quarter (Figure 2). When interpreting the numbers of transition articles per journal in Table 1 and Figure 2, it is important to account for the different sizes of the journals in question. For example, one volume of the *American Journal of Agricultural Economics* contains roughly three times as many articles altogether as one volume of the *European Review of Agricultural Economics*. Hence, the approximately equal numbers of transition articles that have been published in these journals (35 and 33, respectively) reflect very different levels of commitment to the transition topic.

There is no clear pattern in the evolution of the relative importance of individual journals in the transition literature in agricultural economics over time; Figure 1 shows that different journals dominate in different years. Even the journals with large overall shares of the agricultural transition articles over the entire 1989–2008 period have published no transition articles at all in

Fig. 2. Contributions of the surveyed journals to the sample of 244 transition articles (1989–2008, journal name; number of articles).

Source: Own calculations.

some years (e.g. the *American Journal of Agricultural Economics* in 1991, 1999, 2004, 2005 and 2008). Special issues dedicated to agricultural transition topics account for between one-third and one-half of the total number of articles in some years (e.g. the *European Review of Agricultural Economics* in 1998; *Food Policy* in 2000; the *Quarterly Journal of International Agriculture* in 2004). Except for special issues, journals are largely passive as regards the papers offered to them, and fluctuations in the numbers of published transition articles will reflect fluctuations in the number of submissions of manuscripts on the topic, as well as in their quality.

3.2 Trends in the numbers and origins of author

Between 1989 and 2008, a total of 524 authors contributed to the 244 transition articles in the sample. Hence, the average transition article had 2.15 authors (Table 2). The number of authors per paper has trended strongly upward over since 1989, however, from less than 1.5 in the early 1990s to as much as 3 in 2008 (Figure 3). The trend towards increased collaboration and, hence, co-authorship is well established in bibliometrics (e.g. Laband and Tolison, 2000), but the increase reported here is nonetheless striking.

Since many individual authors have contributed to more than one paper, the total number of distinct individuals who contributed to the 244 transition articles is not 524 but rather 333. As a result, the average individual author in the agricultural transition sample has published 1.57 articles on the topic (Table 2). This average hides a significant amount of variation, as presented

Table 2. Characteristics of the 244 agricultural transition articles in the sampled journals (1989–2008)

Characteristic	Score
Number of authors (including repetition)	524
Number of authors (without repetition)	333
Number of papers	244
Papers per author	1.57
Weighted papers per author ^a	0.73
Authors per paper	2.15
Neighbourhood size	2.53
Density	0.0014
Size of the largest component	39 authors (11.7% of all authors)
Size of the second largest component	29 authors (8.7% of all authors)
Size of the third largest component	15 authors (4.5% of all authors)
Clustering coefficient	0.79
Average distance	3.06
Largest distance	8

Source: Own calculations.

^aWeights are calculated so that an author gets half credit for an article written with one co-author, one-third credit for an article written with two co-authors etc.

Fig. 3. Number of articles on agricultural transition, number of authors and number of authors per article (1989–2008).
Source: Own calculations.

in the first two columns of Table 3, which list the top 10 authors in the sample according to two criteria; the total number of articles published, and the number of articles published weighted by the number of co-authors (so that an author gets half credit for an article written with one co-author, one-third credit for an article written with two co-authors etc.). As can be seen in Table 3, the most prolific authors of journal articles on agricultural transition have contributed to far more than the average of 1.57 articles mentioned above.

There have been some significant shifts in the origins of the authors publishing journal articles on agricultural transition over the last two decades. Figure 4 presents the shares of authors coming from the European Union-15 (EU-15), from CEE countries, from the FSU and from other countries. Figure 4 also distinguishes between CEE and FSU authors who wrote the articles in question while working in their ‘home’ regions, and those who wrote while working in the ‘West’ – i.e. the EU-15 or North America.² Three-year backward moving averages (i.e. $MA(X_t) = (1/3)(X_t + X_{t-1} + X_{t-2})$ are graphed) to smooth out large jumps between individual years.³ Immediately

2 We determined authors’ origins using the affiliations mentioned in the articles in question, our own acquaintance with many of the authors in the sample, and in some cases internet searches that provided us with CVs and other information on authors. Of course, we do not have complete information, for example on dual citizenships, that might affect the classification of some authors.

3 To create Figure 4 and all subsequent figures that display 3-year backward moving averages, we first calculate the moving averages of the raw data and then put these in percentage terms (in Figure 4, for example, the 3-year backward moving average number of FSU authors is expressed in per cent of the 3-year backward moving average number of all authors).

Table 3. Top 10 authors of agricultural transition articles (1989–2008) by number of articles, weighted number of articles and selected network criteria

Number of articles		Weighted number of articles		Betweenness centrality		Degree centrality		Neighbourhood size	
Author	Score	Author	Score	Author	Score	Author	Score	Author	Score
J. Swinnen	16	J. Swinnen	9.3	S. Davidova	453	W. Florkowski	27	E. Mathijs	11
Z. Lerman	13	Z. Lerman	7.9	A. Buckwell	360	W. Moon	25	J. Swinnen	10
C. Csaki	10	C. Csaki	6.7	N. Ivanova	332	A. Resurreccion	25	M. Gorton	10
K. Brooks	8	K. Brooks	5.3	E. Mathijs	224	P. Paraskova	25	W. Florkowski	9
S. Davidova	7	S. Bojnec	4.5	M. Gorton	223	L. Beuchat	25	S. Davidova	8
S. Bojnec	7	N. Noev	3.8	J. Swinnen	218	J. Jordanov	25	N. Ivanova	8
H. Gow	6	W. Liefert	3.8	N. Noev	195	M. Chinnan	25	E. Serova	8
M. Gorton	6	M. Petrick	3.5	K. Balcombe	138	J. Swinnen	17	M. Demont	8
W. Liefert	6	S. Davidova	3.3	J. Davis	107	M. Gorton	14	M. Cerovska	8
N. Noev	5	P. Walkenhorst	3.0	J. Lingard	107	Z. Lerman	13	W. Daems	8

Source: Own calculations.

Note: Weights are calculated so that an author gets half credits for an article written with one co-author, one-third credits for an article written with two co-authors etc.

Fig. 4. Origins of authors publishing articles on agricultural transition (3-year backward moving averages from 1991 to 2008, as percentage of all authors).

Source: Own calculations.

following the onset of transition, the majority of the authors contributing to the transition article sample came from Europe and in particular the FSU. In the early 1990s, however, the share of authors from ‘other’ countries (predominantly from or working in North America) increased rapidly. Since the mid-1990s, the share of authors from the EU-15 and the CEE countries has steadily increased, reaching roughly 80 per cent in 2008 if CEE authors working in the EU-15 are taken into account. Hence, research on agricultural transition has increasingly become a European specialty.

The share of authors from the CEE countries increased from 16 per cent in 1996–1998 to 27 per cent in 2006–2008 (Figure 5). This may be an indication that capacity-building efforts in these countries are beginning to bear fruit. What is disconcerting is the overall low representation, and since the early years of the current decade, steadily declining share of contributions by authors from the FSU (Figure 4). While several individual authors from FSU countries, but working in the EU or North America, have published articles in recent years, the share of authors from, and working in, the FSU has declined to under 5 per cent. If two articles published in 2000 (one with seven authors from Uzbekistan, and one with six authors from Kazakhstan) are omitted from the sample, the share of FSU authors is also considerably lower in the early years of the current decade. The inescapable conclusion is that agricultural economists working in Kazakhstan, Russia and Ukraine are making only a very small contribution to the international journal literature on transition issues. Regardless of whether this is due to a lack of capacity or a lack of integration into the international research community, this contribution

Fig. 5. Shares of authors publishing articles on agricultural transition who are from CEE countries (3-year backward moving averages from 1991 to 2008, as percentage of all authors).

Source: Own calculations.

is not commensurate with the vital and growing role that these countries play on world agricultural markets.

Over time, the importance of collaboration, measured as the share of transition articles that have authors from both the 'West' and CEE and/or FSU countries, has increased steadily (Figure 6). While articles authored exclusively by CEE and/or FSU authors initially dominated after 1989, most transition articles published between the mid-1990s and the beginning of the current decade were authored by 'Western' authors alone. In recent years, however, the share of 'East–West' collaborative articles has steadily increased to almost 50 per cent. The share of articles written exclusively by CEE authors has fluctuated between 5 and 15 per cent since the mid-1990s. Only few, and in some years no articles have been written exclusively by FSU authors. Altogether, the evidence presented on author origins suggests that research on agricultural transition has increasingly become a collaborative activity jointly involving authors from EU-15 and CEE countries.

Turning to gender, Figure 7 reveals that between 15 and 30 per cent of all authors were female over the sample period. After reaching almost 30 per cent in the mid-1990s, the share of female authors fell to below 20 per cent in the early 2000s after which it increased steadily to 30 per cent in 2006–2008. However, the use of 3-year moving averages in Figure 7 smoothes out two peak years (1993 and 2008) in which 40 per cent of the authors in the sample were female. Figure 7 also reveals that females are much less often lead authors than males in the agricultural transition literature. While the

Fig. 6. Share of collaborative articles between ‘Western’ and CEE/FSU authors compared with articles by exclusively ‘Western’, CEE or FSU authors (3-year backward moving averages from 1991 to 2008, as percentage of all articles).
Source: Own calculations.

Fig. 7. Share of female authors and shares of articles with female/male lead authors in the sample of articles on agricultural transition (3-year backward moving averages from 1991 to 2008).
Source: Own calculations.

share of articles with a male lead author is above 50 per cent for most of the sample period, the share of articles with a female lead author has fluctuated between 5 and 15 per cent since the mid-1990s. Note that the combined

share of male- and female-led articles is less than 100 per cent because not all articles have a clearly defined lead author. The share of articles on agricultural transition with a clearly defined lead author ranged between 70 and 80 per cent in the first half of the 1990s, but has fallen to roughly 60 per cent in recent years. This partially reflects the trend towards an increasing number of authors per article discussed above (because articles with only one author have a lead author by default and are more common early in the sample period), but it also reflects the fact that collaborative articles in the sample are less likely to have a clearly defined lead author as time progresses.

Finally, Figure 7 shows that in most years over 40 per cent and often over 50 per cent of all authors from the CEE and FSU countries are female. Since, as noted above, between 20 and 30 per cent of all authors in the sample are female, we can conclude that authors from the CEE and FSU countries are disproportionately likely to be female.

3.3 Topics

To analyse the topics and countries/regions that are dealt with in the transition article sample, we divided all articles into 23 country/region and 14 subject categories (Table 4). Almost 21 per cent of the articles in the sample deal with transition countries in general, while 9.4, 6.6 and 2 per cent deal with the FSU, CEE/New Member State and Central Asian regions, respectively. Russia is the individual country that has received the most attention (19 per cent of the articles), followed by Poland (7.4 per cent), Bulgaria (6.6 per cent) and Hungary (6.1 per cent).

While sorting articles according to the country in question is straightforward, sorting by subject categories is necessarily somewhat arbitrary. We based this allocation on the articles' title, abstracts and keywords and, where necessary, a reading of the articles themselves. A first pass over the 244 transition articles was used to generate an initial list of subject categories, and the final list of 14 subject categories was refined in the course of a second pass. This process, the resulting categories and their headings are subjective; given the same sample of articles, other analysts would probably choose different categories and/or sort individual articles into different categories than we did. Furthermore, the boundaries between subject categories are not always sharp. Articles dealing with policy and reforms (categories 2 and 5 in Table 4), for example, often deal, to some extent, with farm size and restructuring issues (category 1) or finance (category 8) as well. Despite these caveats, we are confident that the categorisation presented here does summarise the main areas of agricultural transition research and their relative weights in the relevant journals.

By far the largest group of articles (25.4 per cent) deals with policy and reforms in general, either in individual countries or comparatively for groups of transition countries (categories 2 and 5). Many of these articles can be characterised as stocktaking exercises that review the status of reforms and identify remaining reform priorities. Articles that focus on land markets and

Table 4. Number of articles dealing with specific subjects and specific transition countries or groups of transition countries (1989–2008)

Subject category	Number of articles	Country/country group	Number of articles
1. Farm size/restructuring	36	1. Transition general	51
2. Reforms/policy – individual	33	2. Russia	46
3. Chain/vertical integration	30	3. Former Soviet Union	23
4. Efficiency/productivity	29	4. Poland	18
5. Reforms/policy – comparative	29	5. CEE/NMS	16
6. Trade/competitiveness	20	6. Bulgaria	16
7. Demand/consumer behaviour	15	7. Hungary	15
8. Finance/insurance	13	8. Ukraine	9
9. Labour/households	10	9. Slovenia	9
10. Accession to EU	7	10. Romania	7
11. Prices/market integration	7	11. Lithuania	6
12. Education/research	7	12. Central Asia general	5
13. Subsistence	5	13. Czech Republic	5
14. Theory of transition	3	14. Germany	4
Total	244	15. Kazakhstan	3
		16. Moldova	3
		17. Albania	2
		18. Slovakia	1
		19. Mongolia	1
		20. Latvia	1
		21. Belarus	1
		22. Kyrgyz Republic	1
		23. Armenia	1
		Total	244

Source: Own analysis.

farm structure issues (farm size, legal and organisational structure – category 1) make up 15 per cent of the sample. Articles dealing with chain issues (category 3) such as vertical coordination (or lack thereof) and contracts account for 12.3 per cent of the sample, and articles on efficiency and productivity analysis (stochastic frontier or data envelopment analysis, total factor productivity – category 4) account for a further 12 per cent. Trade and competitiveness articles make up another sizeable category (8.2 per cent – category 6); many articles in this category involve the development or use of empirical trade models. Demand/consumer behaviour and financial markets (categories 7 and 8) each account for a further roughly 6 per cent of the articles in the sample. The remaining categories are all considerably smaller.

Since many of the subject categories in Table 4 contain only a small number of articles, plotting trends over time produces an uneven picture with many discontinuities. For this reason, we generated a second, more general classification of the transition articles based on broader methodological approaches. To this end, articles were classified as being either ‘descriptive’,

‘analytical’ or ‘method-driven’. While ‘descriptive’ is self-explanatory, the distinction between ‘analytical’ and ‘method-driven’ is based on an assessment of whether the analysis of transition issues represents the main motivation for an article (‘analytical’), or whether the transition setting mainly provides a suitable but potentially substitutable opportunity to apply (generally empirical) analytical tools. This assessment is obviously also subjective; we have almost certainly misjudged some authors’ motivations, and co-authored articles may very well be the result of different underlying motivations on the part of different individuals. We wish to stress that the term ‘descriptive’ is not intended to be in any sense pejorative; a sound analytical framework is the point of departure for any focused and cogent description. Furthermore, descriptive work has played an important role in disseminating objective information about what is happening in transition countries, especially in the early years of transition.

Although the results of this classification must therefore be interpreted with caution, they are quite suggestive (Figure 8). Articles that mainly describe the situation in transition countries and the changes taking place in them accounted for two-thirds of the sample in the early 1990s. Articles that apply economic analysis to the issues and challenges posed by transition accounted for the remaining one-third, a share that rapidly increased to over two-thirds by 1997. In the late 1990s, method-driven articles began to account for a steadily increasing share of the journal literature on transition, and in recent years this category has become dominant, recently attaining a

Fig. 8. Shares of ‘descriptive’, ‘analytical’ and ‘method-driven’ articles on agricultural transition (3-year backward moving averages from 1991 to 2008, as percentage of all articles).

Source: Own calculations.

share of over two-thirds. This suggests that the literature on agricultural transition entered the ‘mainstream’ in the course of the last decade, with empirical methods playing an increasingly important role and supplanting more qualitative and policy- or issues-driven analysis.

3.4 Network analysis

In the field of bibliometrics, the study of citation networks has a long tradition. An analysis of citation networks in our sample of journal articles on transition would be interesting, but is beyond the scope of this paper. However, network analysis can also be applied to co-authorship and patterns of collaboration between researchers (Newman, 2004). In the following, we provide an overview of the co-authorship network in our sample of agricultural economics journal articles, and describe some of the patterns of collaboration that this analysis reveals.

Some key characteristics of the co-authorship network are presented in Table 2. The numbers of papers and authors were discussed in Section 3.2. The density of the entire network, defined as the ratio of the actual number of links between authors relative to the number of possible links (Wasserman and Faust, 1994) is 0.0014. This is low, and is reflected in the graphical depiction of the co-authorship network in our sample of transition articles (Figure 9). In this depiction, each node represents an author, and two authors are connected by a line if they have co-authored one or more articles. The circles associated with some nodes indicate single-author articles. Figure 9 and all the other calculations and visualisations of network concepts presented below were carried out using the tools provided in the Social Network Analysis (‘sna’) package in the R statistical computing environment (Butts, 2007).⁴

The network in Figure 9 is characterised by many disconnected groups of 1, 2 or 3 authors, which is why it has such a low overall density. There are some larger clusters of interlinked nodes in Figure 9. These clusters, defined as groups of nodes such that any one node can be reached via some path from any other, are referred to as ‘components’ (Wasserman and Faust, 1994). The largest component in our network comprises 39 authors and accounts for 11.7 per cent of the authors in the network. Examination of the individuals in this cluster (Figure 10, component a) reveals that it might be regarded as an ‘EU network’ component. The second largest component, which might be labelled ‘Leuven’, links 29 authors and accounts for 8.7 per cent of the authors in the network (Figure 10, component b). The third largest component with 15 authors could be called ‘Washington’ (Figure 10, component c) as it

4 The placement of the nodes and the vertices or lines between them in Figure 9 is determined using a force-based algorithm developed by Fruchterman and Reingold (1991). This algorithm treats nodes like celestial bodies or atomic particles that, depending on the distance between them, exert attractive or repulsive forces upon one another along the vertices that join them. Adjustments in this system of nodes leading to an equilibrium or minimum-energy state are simulated using simulated annealing methods.

links authors who are commonly associated with the World Bank, IFPRI and the USDA. Figure 9 reveals that the remaining clusters in the co-authorship network are considerably smaller.

The ‘clustering coefficient’ describes network ‘transitivity’ by measuring the probability that two of an author’s co-authors have themselves co-authored an article (Newman, 2004). It is an indicator of the importance of small groups or components in a network (Acedo *et al.*, 2006). The relatively high value of 0.79 for the transition article authorship network (Table 2) confirms the observation that this network is characterised by many small internally interlinked but otherwise insular groups of authors. Newman (2004) reports clustering coefficients of 0.066, 0.43 and 0.15 for the fields of biology, physics and mathematics, respectively. However, since we consider only a relatively narrow sub-discipline, our clustering coefficient cannot be directly compared with these. It is expected that transitivity is higher within a sub-discipline such as agricultural transition, and our network will not capture many non-transitive co-authorship links from authors in our sample to authors outside this sample in different other sub-disciplines who, in turn, have no links to one another.

The ‘distance’ scores in Table 2 measure how many other authors are located on the path between a pair of authors. Two individuals who have co-authored an article, for instance, are distant 1 apart; two individuals who have no common paper but share a common co-author are distant 2 apart; etc. In our network, the average distance is 3.06 and the largest distance is only 8 (observed in Figure 10, component a). This confirms the predominance of small groups of authors in the transition article network. Newman (2004) reports distance measures for biology, physics and mathematics that are as high as 24 and 27, but, again, higher distance measures are expected for broader disciplines in which paths can span disparate sub-disciplines.

Network analysis can also provide information about the relative influence and position of individual authors within a network structure. One common measure is ‘betweenness centrality’ which, for a given node X, measures the number of shortest paths between other nodes in the network that pass through X (Newman, 2004). Individuals who coordinate the flow of information between others in a network will have high betweenness scores, so this measure is sometimes interpreted as a means of identifying ‘information brokers’ (Newman, 2004; Acedo *et al.*, 2006). The highest betweenness centrality score in the network of transition articles belongs to Davidova (453), followed by Buckwell (360) and Ivanova (332; see Table 3). These individuals’ high scores result from their central positions in the largest network component (Figure 10), which would fragment considerably if any one of them were removed. Indeed, each of the 10 top-ranked authors in terms of betweenness centrality belongs to one of the two largest network components (‘EU network’ or ‘Leuven’).

Two other measures of individual position within a network are ‘neighbourhood size’ (which measures the total number of co-authors with whom an

Fig. 9. The co-authorship network in the sample of journal articles on transition in agricultural economics.
Source: Own calculations using ‘sna’ (Butts, 2007).

Fig. 9. Continued.

Fig. 10. Major components of the co-authorship network in the sample of journal articles on agricultural transition.
Source: Own calculations using ‘sna’ (Butts, 2007).

author has collaborated) and ‘degree centrality’ which counts the number of links that an author has to other authors. The difference between an author’s neighbourhood size and degree centrality is that the latter will count a collaborator as many times as he/she has co-authored papers with the author in question. The average neighbourhood size is 2.53 in our network (Table 2), which indicates that the average author has collaborated with 2.53 co-authors. Table 3 reveals that individual authors in the sample (e.g. Mathijs, Swinnen and Gorton) have much larger neighbourhood sizes than this average. Contrasting the neighbourhood size and the degree centrality rankings in Table 3 reveals that some authors who do not count among the top 10 in terms of neighbourhood size have nevertheless collaborated repeatedly with the authors in their neighbourhoods, thus leading to high-degree centrality rankings. Indeed, the top seven authors in terms of degree centrality have all contributed to the same four papers. These authors make up a small

Fig. 10. Continued.

but strongly interlinked component, which is visible slightly above the middle of the left side of Figure 9.

A final indication of the importance of individual authors in the network is provided in Figure 11, which illustrates the relationship between the 14 subject categories introduced in Section 3.3 (depicted as diamonds) and authors (circles). A line between an author and a subject category indicates that the author has contributed to an article in that subject category. The thickness of this line reflects how many such contributions the author has made, and the size of an authors' node reflects the total quantity of papers that he/she has produced. Figure 11 reveals that most authors have contributed only one or two papers to a specific subject category, but that a relatively small number of authors located towards the middle of the diagram have not only produced many papers, but have also written on, and thereby link together, several

Fig. 11. The subject category network in the sample of journal articles on transition in agricultural economics.

Source: Own calculations using ‘sna’ (Butts, 2007).

different subject categories. The central role of names such as Bojnec, Brooks, Csáki, Davidova, Koester, Lerman, Liefert, Noev and Swinnen in Figure 11 will come as no surprise to anyone who has followed the agricultural transition literature over the last two decades. What may surprise some is that relatively few individuals play such a central role. While many authors have contributed to the literature on agricultural transition, it is fair to say that this literature has been strongly shaped by perhaps 10 especially prolific and well-linked colleagues.

4. Conclusions

In this paper, we present the results of an analysis of journal articles on agricultural transition issues published in 16 international peer-review field journals in agricultural and transition economics. The articles account for 2.8 per cent of all articles published in these journals between 1989 and 2008, but there are signs of a slowdown or stagnation in the number of these articles

since the beginning of this decade. Increasingly, articles on this topic are being written by authors from the EU-15, whose collaboration with authors from the CEE countries has been growing in recent years. The relative importance of authors from 'other' countries (predominantly North America) has fallen steadily since the mid-1990s. With the brief exception of the early 1990s, authors from the FSU countries have not made a large contribution to the agricultural economics journal literature on transition issues.

The four largest subject categories identified in the agricultural transition literature are reforms and policy, farm size and structure, the food chain and vertical coordination, and productivity and efficiency. There is evidence that agricultural economic transition articles are becoming increasingly method-driven and less descriptive or issue-driven than they were in the 1990s. The co-authorship network for the transition articles is characterised by a low density and a predominance of individual authors or small groups of authors who have published only one or two papers. Three especially notable network components or clusters are identified, which might be labelled an 'EU network' component, a 'Leuven' component and a 'Washington' component, respectively. A small group of perhaps 10 individual authors plays a central role in these components and in linking the different subject categories in the sample of agricultural transition articles.

The analysis presented in this paper suffers from limitations that could be dealt with in future work. Our sample of transition articles covers what has been published in the main international field journals in agricultural economics and transition economics, but fails to capture articles in journals from related fields such as consumer studies, land use and regional studies. Surveying these journals would probably yield relevant articles by agricultural economists. The list of journals to survey could also be expanded to include non-English language peer-reviewed journals in Europe such as the German *Agrarwirtschaft*, and national journals in CEE and FSU countries. It would be especially interesting to study the activity of authors from CEE and FSU countries in these journals.

A major extension would be to go beyond journal articles and expand the dataset to include conference papers and studies produced in an advisory capacity, for example for and with the World Bank, the European Commission and the EBRD. An interesting question to address with such a dataset would be whether these other types of publication are characterised by the same authors and co-authorship networks as the journal articles. For example, have the same clusters of authors identified in the journal article network been collaborating on these other types of publications as well, or do the co-authorship relationships in the other types of publication significantly increase the density of the overall network? If our finding that the journal literature is moving towards more method-driven articles is accurate, then one might expect to find that the journal literature increasingly resembles the conference paper literature in terms of collaboration and topics as time goes by, and becomes increasingly distinct from the more issue-driven studies that are produced for international donors and financial institutions.

Another major extension would be to carry out a citation network analysis of the transition articles, with or without the inclusion of the other journals, conference papers and advisory studies discussed above. Citation analysis would presumably reveal more links between the relatively disconnected components in the co-authorship network, as authors who do not necessarily collaborate directly nevertheless make use of and cite each others' work.

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Supplementary data

Figures 9, 10 and 11 are available to view as high resolution pdfs online as supplementary data at *ERA* online.

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