POST-PRODUCTIVISM IN QUESTION: EUROPEAN AGRICULTURE, 1975-1997

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ABSTRACT

Much of recent research in agricultural geography centers on whether a transition from productivism to post-productivism occurred. This transition is typically posited as a major restructuring of agriculture away from national-based agriculture to globally based agriculture. Post-productivist agriculture additionally is held to be less specialized, more focused on quality, and more environmentally friendly than its productivist counterpart. This paper examines one of these contentions in more detail by assessing the degree to which changes in specialization among farms in Europe provide evidence for a transition to post-productivism. Statistical analysis illustrates that a significant move toward further specialization existed in Europe from 1975 to 1985. After 1985, while specialization continued to take place in most cases, the rate at which farms continued to specialize slowed dramatically.

Keywords: agriculture, Europe, post-productivism, specialization

INTRODUCTION

While it is typical to analytically separate agriculture from industry in geography, agriculture has become increasingly industrialized in the last century in many parts of the world. It is not surprising then that there exists a parallel vocabulary in the academic study of agriculture and industry. Terms like "Fordist" and "post-Fordist" in industrial studies thus have their agricultural parallels in "productivist" and "post-productivist." The purpose of this paper is to more thoroughly examine the transition from productivism to post-productivism in agriculture that is said to have occurred in the late 1980s in Anglo-America and Europe, about a decade after the transition from Fordism to post-Fordism occurred in industry. Just as post-Fordism has been associated in the literature on industrial transition with a movement away from economies of scale to a focus on economies of scope, from competition based on price to competition based on quality and an increased focus on labor-based technologies, so too has post-productivism been associated in the literature on agricultural transition with declining agricultural specialization, an increased focus on quality and a less intensive use of land.

An additional similarity between the study of industry and agriculture in the latter part of the 20th century is the considerable disagreement over the occurrence of both a transition from Fordism to post-Fordism and a transition from productivism to post-productivism. In the case of industry, Piore and Sabel (1984) argued for a "second industrial divide," while Dohse, Jurgens and Malsch (1985) suggested the events of the 1980s represented an extension of Fordism which they labeled "Toyotaism." In the same vein, Murdoch, Marsden and Banks (2000) suggest a transition in agriculture which they herald as "a new food regime," while Evans, Morris and Winter (2002) find no evidence to support the suggestion.

This paper examines European Union agricultural data for evidence of a shift from productivism to post-productivism. This is not the first paper to use this approach. Previously, Bowler and Ilbery (1999), Kristensen (2001), Mora and San Juan (2003), and Bradshaw (2004) have each performed national-level studies of this same phenomenon. The advantage of the approach used here lies in its cross-national focus. Additionally, this study uses a linear modeling-based approach. Previous studies have typically employed entropic methods which have serious limitations (see Fotheringham and Knudsen 1987).

Examination of a potential transition to post-productivism is important on three grounds. First, if a shift from productivism to post-productivism has occurred, then it is important to understand why this shift happened. Second, if the shift has occurred, it is incumbent on geographers to theorize this new form of agriculture. Third, any shift has important implications for policy. For example, if much of current environmental legislation concerning agriculture is directed at problems that surround national-based, productivist agriculture, then this legislation may well need restructuring for a post-productivist agricultural world.

The next section of the paper examines European agriculture. A discussion of the literature on the shift to post-productivism follows in the next two sections of the paper. Section five presents the data and a methodology for the analysis. This is followed with the results of the analysis and conclusions.

THE EUROPEAN SCENE

European agriculture is a large and complex endeavor. The European nations are prominent players in the global agro-food complex. Farming accounts for 4% of EU-15 employment

and the EU has some 6.8 million farms (Eurostat 2004). While the 1980s were a time of decline in the number of family farms in Britain and, especially, North America in favor of transnational corporations, family farms remain dominant in much of Europe (Moran, Blunden and Bradly 1996). Additionally, European farmers are often organized into cooperatives and producer marketing boards which integrate farming in much the same manner as transnational corporations, but allow farmers greater control of processing and marketing (Knudsen and Hansen 1999). These same institutions also restrict competition in international markets and limit the penetration of international capital into agriculture (Moran, Blunden and Bradly 1996).

It is difficult to discuss European agriculture without reference to the Common Agricultural Policy (CAP). The policy was introduced in 1962 to promote technological innovation and self-sufficiency in Europe (Barnard 1999a). With its focus on production of meat, cereals and dairy products, it led by the 1980s to both inequitable income distributions among farmers (80% of CAP subsidies went to the richest 20% of Europe's farmers) and over-production on a massive scale. The first round of CAP revisions in 1984 set limits on CAP subsidies at 74% of the EC budget, and introduced both milk quotas and set-asides which paid farmers not to produce (Barnard 1999a). Additional reforms in 1992 refocused CAP away from production toward direct farm subsidies and, after 1996, fixed the overall level of subsidies at $49 billion (Fischler 1999; Burton 2004). The Agenda 2000 reforms further loosened the ties between subsidies and production, froze CAP spending at $42 billion through 2006, slashed guaranteed prices on cereals and beef by 15% and 20% respectively, increased the level of set-asides, and more tightly focused CAP on issues of rural development *per se* (Barnard 1999a; Fischler 1999). These reforms also allowed withholding of subsidies by individual nations for non-compliance by farmers with national and EU environmental regulations (Fischler 1999). The result of the Agenda 2000 reforms has been a decline in the profitability of farming in Europe which has been felt especially hard in the UK and Germany.

Within the last decade, virtually all of the EU nations have experienced some form of recent agriculturally-related health crises. Crises include the discovery of bovine spongiform encephalopathy (BSE) in the UK (and elsewhere), outbreaks of foot and mouth disease (FMD), the Belgian Coca-Cola and dioxin scandals, the Danish salmonella outbreak, and the Dutch problems with swine fever to name a few (Barnard 1999b; Kiely 2001; Sporleder and Goldsmith 2001; Franks *et al.* 2003; Burton 2004).

The result of these health scares is that "naturalness" has become an increasingly prized attribute of agricultural commodities in Europe. This has played out in three ways. First, throughout the 1980s use of fertilizers and pesticides declined dramatically within the EU (Statistisches Bundesamt 1995). Second, there is growing resistance to additives in and genetic modification of food. At various times the EU, or nations in the EU (occasionally in defiance of formal EU policy) have banned the importation of hormone-injected beef, genetically modified seed or genetically modified food (Barnard 1999a; Editors of *Europe* 1999). Third, an exponential increase in the number of organic farms occurred and organic products are widely available in most European grocery stores. While the number of organic farms in the EU is an insignificant proportion of the total number of farms, organic farming is a significant industry in parts of the EU, notably Austria, and organic farming is generally believed to be *the* high growth, high profit arena within European agriculture in the 21st century (Editors of *Europe* 1999).

THE ARGUMENT FOR A TRANISTION FROM PRODUCTIVISM TO POST-PRODUCTIVISM

The argument for a transition from productivism to post-productivism presupposes the existence of food regimes. A food regime is taken to be an integrated, historically contingent, global food system or mode of accumulation (Bowler and Ilbery 1987; Arce and Marsden 1993). The concept of a food regime thus links international relations of food production and consumption to particular forms of capitalist accumulation characteristic of particular historical junctures (Friedmann and McMichael 1989; McMichael 1993; Ufkes 1993a, 1993b). Within the literature on agriculture, two food regimes have been identified since the close of World War II – the productivist regime and the post-productivist regime.

The productivist regime based on livestock production and industrialized foods is held to have run from after the Second World War until the late 1980s (Hamilton 1985; Grant 1993; Le Heron and Roche 1996). Productivism is generally defined as "a commitment to an intensive, technologically and industrially driven and expansionist agriculture with state support based primarily on output and increased productivity" (Lowe *et al.* 1993 p. 206, see also Lowe *et al.* 1993 p. 221). Central to productivism is an ideology that assumed linkages between national agriculture, national security and industrial growth (Wormell 1978; Goodman and Redclift 1991; Grant 1993; Ufkes 1993a, 1993b; Burton 2004; Wilkie 2005). Additionally, the "productivist regime" included a network of institutions oriented toward helping boost food production. These included ministries of agriculture and other state agencies, input suppliers, financial institutions, research, development and extension services (Cloke and Goodwin 1992; Arce and Marsden 1993; Grant 1993; Lowe *et al.* 1993; Marsden *et al.* 1993; Ufkes 1993a, 1993b; Wilson 2001). This led to increasingly specialized capital inputs, an increasingly global market, standardized products and converging production methods (Arce and Marsden 1993).

By the mid-1980s it became clear that agriculture had entered a crisis of chronic over-production characterized by intense competition and market collapse (FitzSimmons 1986; Arce and Marsden 1993; Grant 1993; Ward 1993; Walford 2003; Goodman 2004; Wilkie 2005). Additionally, throughout the 1980s trade liberalization agreements opened national markets eroding traditional, productivist institutional and regulatory structures designed to insulate national farm sectors from global competition (Ufkes 1993a, 1993b; McMichael 1993). During this time, Murdoch, Marsden and Banks (2000 p. 112) note the "growing specialization of agricultural enterprises and regions, integration of agriculture into increasingly longer food chains, growing dominance of large, transnational capitals and the expansion of commodity relations." This trend further weakened the position of the farmer within the food system, a system increasingly dominated by agribusiness and food retailers (FitzSimmons 1986; Bowler and Ilbery 1987; Flynn and Marsden 1992; Marsden *et al.* 1996). By increasingly integrating their backward and forward linkages, and through the emergence of contract farming (Wallace 1985), agribusiness and retail firms seemed to greatly expand their influence within certain key sectors of agriculture. The crisis led to a financial bifurcation in farming – large farms survived and small farms were left "teetering on the brink of extinction" (Wilkie 2005 p. 216). Chronic overproduction, the increasing multinationalization of food chains and the collapse of the small, family farm led to political backlash in the form of debate over budgetary (typically subsidy), production and environmental problems (Ward 1993; Brouwer and Lowe 1998; Morris and Evans 1999).

Fundamental cultural shifts in the way in which rural areas were valued also began about this time (Krause 1999; Mather 2001; Demossier 2003). As a result, it has been argued that by the dawn of the 1990s, the productivist regime of agriculture had come to an end.

As is typical of emerging phenomenon (post-Fordism again provides an excellent example), no concise definition of post-productivism has emerged. However, the post-productivist regime has been characterized by "a reduced output of food, the progressive withdrawal of state subsidies, the production of food within an increasingly competitive international market, and the growing environmental regulation of agriculture" (Barrett *et al.* 1999 p. 160). Wilson (2004) suggests that "post-productivism implies that…agriculture is no longer seen to be solely concerned with the production of food and fibre…but that it comprises a multitude of functions with an emphasis on food quality, environmental conservation and a move away from state-sponsored production subsidies that have encouraged agricultural intensification" (p. 461). As such post-productivism is associated with "the greening of agricultural policy," "changing farming ideologies," and "a shift toward more environmentally friendly farming methods" (p. 462). Post-productivism is suggested not only as a new form of agriculture, but it also signifies the moving away in agrarian priorities from food production to meeting broader rural development and environmental objectives (Marsden *et al.* 1996; Morris and Evans, 1999). It also has been defined as involving fragmentary production in which natural, locally embedded foods focused on health and quality is dominant (Goodman and Redclift 1991; Watts 1995; Murdoch, Marsden and Banks 2000). The result is a shift away from quantity of production towards quality of production, the growth of alternative farm enterprises, and state efforts to promote sustainable agriculture (Morris and Evans 1999). Focus on post-productivism has led to a flowering of research on alternative farm enterprises (van der Ploeg *et al.* 2000; Barlas *et al.* 2001) and alternative or shortened, local and embedded food chains (van der Ploeg 1990; van der Ploeg and van Dijk 1995; van der Ploeg and Frouws 1999; Sporleder and Goldsmith 2001; Winter 2003; Ilbery *et al.* 2004; Goodman 2004; Watts, Ilbery and Maye 2005). However, a recent literature has emerged that questions the claims of a transition to post-productivism and it is to that literature that we now turn.

THE SKEPTICS OF POST-PRODUCTIVISM

Claims of a post-productivist transition have increasingly aroused skepticism in recent years (Phillips 2004). Wilson (2004 p. 461) notes that there continues to be fundamental conceptual and theoretical questions concerning "the nature, pace and even existence of the transition from a 'productivist' to a 'post-productivist' agricultural regime." We examine the conceptual and theoretical arguments against post-productivism in turn.

Conceptually, the skeptics of post-productivism argue that regime theory is too focused on the role played by forces exogenous to agriculture (Holmes 2002; Wilson 2001). In particular, current explanations of post-productivist shift ignore both the economic and social realities of farming. Argent (2002) examines the post-productivist claims of pluractivity, extensification, dispersion of production and the creation of a consumptionist countryside in the Australian context. He finds that much pluractivity is more related to "the 'last gasp' attempts to ensure the economic survival of the family farm" than to any transition to post-productivity (p. 108). Speaking to the social realities of farming, Wilson (2001 p.89) notes that "mental landscapes of European agriculture remain relatively unchanged and embedded in productivist modes of thinking." This theme is echoed by Howden and Vanclay (2000) who note the importance of farming styles, mythological constructions of ways of farming that don't actually exist and are stereotypical, but nevertheless exert social

control over farmers' activities. Burton (2004) also examines farming styles and argues that farmers who are productivists have high stature as "good farmers" within their communities because productivist farming is still the acceptable farming style. Burton (2004 pp. 209-210) concludes that the "connection between farmers and the production oriented approach to farming goes far deeper than simple economic advantage or aesthetic preference."

From the point of view of theory, post-productivism also suffers from a number of weaknesses. First, it "reifies notions of localness and fails to fully explicate embeddedness, trust and personal interaction" (Goodman 2004 p. 11). Second, it needlessly periodizes agricultural transition (Goodman 2004; Wilson and Rigg 2003; Wilson 2001; Rigg and Ritchie 2002; van Huylenbroeck and Whitby 1999; van Huylenbroeck and Durand 2003). Third, use of periodizations suggests a reversal of modes of operation to which Evans, Morris and Winter (2002 p. 324) conclude "if claims [of a transition to post-productivist agriculture] are founded on the theorization that productivist processes are being reversed, then current evidence shows them to be untenable." Finally, use of terms such as productivist and post-productivist suggest a homogeneity to agricultural practice that simply doesn't exist (Walford 2003).

Summarizing, the concept of post-productivism holds promise as an interpretative tool, but potentially suffers from numerous conceptual and theoretical flaws. When faced with competing explanations, it is often useful to explore things empirically. It is to this we next turn.

PREVIOUS EMPIRICAL STUDIES OF THE TRANSISTION TO POST-PRODUCTIVISM

There exists general agreement that potential restructuring in agriculture between pro-ductivism and post-productivism can be assessed empirically along three axes:

- intensification/extensification (I-E)
- concentration/dispersion (C-D)
- and specialization/diversification (S-D)

Continued productivism would involve continued intensification, expansion of farm size and further specialization, while post-productivism would, in theory, involve, at the very least, a slowing of these same trends, if not their reversal (Bowler 1987; Bowler and Ilbery 1997, 1999; Kristensen 2001; Walford 2003; Bradshaw 2004).

Previous research which has empirically examined a potential shift to post-productivism has used at least three separate methods to assess the transition to post- productivism. The methodology used by Bowler and Ilbery (1997) and Kristensen (2001; see also Bowler 1987; Bowler and Ilbery 1999) utilizes a tripartite measurement system:

$$\text{I-E} = \Delta\ \text{SGM} / \text{AA} \qquad (1)$$

$$\text{C-D} = \Delta\ \text{AA}/\text{EA} \qquad (2)$$

$$\text{S-D} = \Delta\ \text{Hr} \qquad (3)$$

where SGM is standard gross margin, AA is total agricultural area, EA is number of farms, and Hr is defined as:

$$\text{Hr} = \text{H}/\text{H}_{max} \qquad (4)$$

where $H = - \Sigma\ (IF \log_{10} IF)$ and $H_{max} = - K(1/K \log_{10} 1/K)$ where IF is land use i as a percentage of total farmland and K is the number of land use classes. While $-\infty \leq \text{I-E} \leq \infty$ and $-\infty \leq \text{C-D} \leq \infty$, it is the case that $0 \leq \text{Hr} \leq 1$. I-E, C-D, and Hr are indices and do not have known distributions.[1] Bowler and Ilbery (1997) find that 16 of the 76 EU regions studied showed signs of a move toward post-productivism during the period 1979-1987. Using the same approach, Kristensen (2001) analyzed evidence

[1] Interestingly, if Hr took the form $\text{Hr} = |\ H - H_{max}|$, then Hr would, under reasonable assumptions, be distributed as Student's t (Fotheringham and Knudsen 1987).

for post-productivism in 255 municipalities in Denmark between 1982 and 1989. She found that 158 of the 255 municipalities had the same position with respect to these measures at the end of the study period as the beginning, 44 moved in the direction of post-productivism and 53 moved toward productivism. She concludes that evidence for post-productivism is, at best, mixed (see also Kristensen, Thenail and Kristensen 2004).

Two additional approaches are limited to an assessment of specialization/diversification only. Bradshaw (2004) uses a simple Herfindahl index to assess degree of specialization:

$$H = \Sigma P_i^2 \quad (5)$$

where P_i is the proportion of the ith crop relative to the total land area. The Herfindahl index has the property $0 \leq H \leq 1$ so that complete specialization is indicated by $H = 1$ and complete diversification is indicated by $H = 0$. Inputs to the measure take the form of area (e.g. hectares) in crop i. Because H is an index, it does not have a known distribution, which makes ordinary significance testing impossible. Limited significance testing with H is possible, however, using bootstrapping procedures (Knudsen 1987). Using the measure to examine farmers in Saskatchewan, Bradshaw finds little evidence of any trend toward diversification.

A final approach involves information gain (Kullback and Liebler 1951). Mora and San Juan (2004) utilize the information measure:

$$I(P:Q) = \Sigma p_i \log_N (p_i / q_i) \quad (6)$$

where I(P:Q) is the information gained from observing distribution P given distribution Q, p_i is the probability of an event y_i, and q_i is the probability of the prior event z_i. Given that $\Sigma y_i = \Sigma z_i = T$, then:

$$MDI = 2T * I(P:Q) \quad (7)$$

where MDI is asymptotically chi-square distributed (Bishop *et al.* 1975; Phillips 1981; Fotheringham and Knudsen 1987), a property not used by Mora and San Juan (2004), who utilize bootstrapping methods instead. Mora and San Juan (2004) examine specialization in Spanish agriculture in the period 1979-1997. They find that total farm specialization increased across the study period by 17%. Further they find that 58% of increased specialization is due to increased specialization in counties already highly specialized in 1979. They point out that this conclusion raises questions as to whether or not farms in the EU are increasingly becoming multifunctional as is the intent of more recent EU intervention in farming.

However, previous empirical analyses are far from unproblematic. First, previous empirical analyses have relied entirely on indices without known distributions, or where available, distributions have not been used. This has limited the interpretability of findings. Second, with the exception of Bradshaw (2004), empirical analyses have relied on information based statistics – entropy in the case of Bower and Ilbery (1997) and Kristensen (2001) and information gain for Mora and San Juan (2004). Information statistics have previously been shown to be difficult to interpret because of their nonlinearity (Fotheringham and Knudsen 1987). Third, previous analyses by Bower and Ilbery (1997) and Kristensen (2001) are further clouded by measurement issues. Increasing or decreasing intensification is an ambiguous measure of post-productivism since, for example, both quantity-based (productivist) and quality-based (post-productivist) agriculture can be intensive. Farm size is an equally imperfect measure. Farm size has increased everywhere in Europe and appears to be causally unrelated to any discussion of post-productivism (see Kristensen 2001). Indeed one could speculate that these issues lie behind the choices of Bradshaw (2004) and Mora and San Juan (2004) to utilize measures of specialization alone.

METHODOLOGY

As a result, of the logical problems associated with including measures of intensiveness and farm size, only a measure of specialization is included in this analysis and specialization is modeled directly (see Page 1996 for a similar method). While not an ideal measure, specialization can be exploited empirically to measure post-productivism because of the role that fragmentary agriculture plays in post-productivism – the growth in the number of farming units (but not necessarily the number of hectares) engaging in specialized agriculture slows or the number of farming units engaged in specialized agriculture actually declines under post-productivism. Even here, one must be careful. For example, a simple slowing of the trend toward specialization may be due to post-productivism, or specialization may simply slow as the percentage of specialized farms tends toward 100%.

The data for the paper are from the European Community (EC)/European Union (EU) and include the number of farms in a given region, in a given year, engaged in either specialized (field crops, horticulture, permanent crops, grazing livestock, and granivores) or "generalized" (mixed cropping, mixed livestock and combination livestock-cropping) agriculture as defined by the EC/EU. In each case, farms are classified according to preponderance of standard gross margin. For example, a farm classified as a specialized farm involved in field crops is a farm wherein more than 2/3 of the farm's standard gross margin originates from field crops (Eurostat 1998). Conversely, farms listed as generalized are farms wherein 2/3 of the farm's standard gross margin originated in two or more specialized categories. The advantage of this approach is that standard gross margins provide a measure for farm classification that accounts for farm size and intensity of production.

Data for the country-level analysis were gleaned from EC and EU Agriculture Statistical Yearbooks (Eurostat 1998). Data are number of specialized and generalized farms in the core nine countries of the EC in 1975, 1979/80, 1983, 1985, 1987, 1989/90, 1993, 1995 and 1997. Additions to the EC (Greece, Spain and Portugal) were handled using the method of structural zeros (Feinberg 1981). Austria, Finland and Sweden were excluded from the analysis for lack of data.

The regional analysis utilized data for the EUR 12 countries acquired from Eurostat (2004) at the nomenclature of territorial units for statistics (NUTS) 2 level for 1989/1990, 1993, 1995 and 1997. Not all countries collect data on farm holding type at the NUTS 2 level and in some cases countries are small enough to be classed as NUTS 2 regions. For example, Belgium, Germany and the United Kingdom report specialization only at the NUTS 1 level, and Denmark, Ireland and Luxembourg are NUTS 2 regions (Eurostat 2004). NUTS provide a single uniform breakdown of territorial units for the production of regional statistics for the EU. It should be noted that boundaries of the NUTS 2 regions changed slightly over the 1990-1997 period. However, the boundary changes are not severe enough to create problems with the data.

Because concern here is with change in number of specialized farms, the raw data were transformed into a two–dimensional contingency table having dimensions region and year, where tabular entries correspond to percent specialized farms. After suitable tests to ensure normality, these data then were analyzed using a temporally-lagged, weighted ANOVA model (Berzeg 1978, Feinberg 1981; Flowerdew and Lovett 1988; Knudsen 1992; McCullagh and Nelder 1983) of the form:

$$F^{r}_{k} - rF^{r}_{k-1} = a + bD^{r} + cT_{k} + E^{r}_{k}$$

which was operationalized as:

$$F^r_k = a + rF^r_{k-1} + bD^r + cT_k + E^r_k \quad (9)$$

where F^r_k denotes the percentage of specialized farms in region r at time k, F^r_{k-1} denotes the number of specialized farms in region r in the previous time period, D^r is a dummy variable denoting region, T_k is a dummy variable denoting time k, and E^r_k is a normally distributed error term. Use of a temporal lag, as opposed to the more traditional form of the dependent variable ($F^r_k - F^r_{k-1}$) limits temporal autocorrelation, while use of a regional variable limits spatial autocorrelation (a supposition borne out by plotting the model residuals). Use of weighted least squares is necessary to ensure homoscedasticity (Berzeg 1978). These weights take the form $F^r_i / \Sigma_{r,i} F^r_i$ (Knudsen 2000).

The intercept and parameters associated with the lagged variable and each categorical variable are determined in calibration of the model. The ratio of the parameters to their standard errors is distributed as t and goodness-of-fit is measured as R-squared (Wonnacott and Wonnacott 1981). It is expected that the parameter r will be significant and approach 1.0 in all cases.

Where the independent variables are categorical, parameter estimates are determined only up to an additive constant. Thus while the value of the parameters, in an absolute sense, is essentially arbitrary, conditional inference relative to categories within a given variable is still possible. In the calibration used here, this is accomplished by arbitrarily setting the parameter associated with the first category of each variable to zero and determining the remaining parameters with respect to this first parameter or numeraire.

The model is a form of statistical shift-share analysis (Berzeg 1978, 1984; Knudsen and Barff 1991; Knudsen 2000). That said, the model itself is a model of change in percentage of specialized farms where that change can be attributed to location of farm and time period. The intercept in the model measures average change in specialization across all regions and time periods, while the regional parameters measure deviation from average change accounted for by each region, relative to the regional numeraire, and the temporal parameters measure deviation from average change accounted for by each time period, relative to the temporal numeraire. In the context here, the regional and temporal parameters can be construed as regional and EC/EU policy effects respectively.

COUNTY-LEVEL ANALYSIS

In 1975, at the beginning of the study period, the EC contained 5.8 million farms. Of these farms, almost half were in Italy (2.7 million), and France (1.3 million) and Germany (900 thousand) accounted for much of the rest. At that time, approximately 68% of EC farms were classed as specialized, with Ireland (92%), Netherlands (84%) and the United Kingdom (84%) having the highest percentage of specialized farms (Table 1).

Twenty-two years later, EC farming differed in at least three respects. First, new countries had joined the union – Greece in 1983 and Spain and Portugal in 1987. Second, because of the entrants the number of farms had grown to 6.6 million. Decline in number of farms was concentrated in the nations having the largest number of farms (Italy, France, Spain, Greece and Germany), but decline as a percentage of all farms was most pronounced in Denmark (51%), Luxembourg (50%) and Belgium (48%). Third, approximately 81% of all farms were classified as specialized, an increase of 13%. Countries that were highly specialized at the beginning of the study period remained the most specialized to the end. However, Portugal (25% increase), Germany (21% increase) and Denmark (20% increase) most increased their specialization in agriculture over the study period.

Table 1: EC/EU Percent Specialized Agriculture, 1975-1997

Country	1975	1980	1983	1985	1987	1990	1993	1995	1997	Cumulative Change
Belgium	64.92	70.16	72.72	71.38	72.54	76.30	78.71	79.01	79.23	14.31
Denmark	56.13	61.73	68.02	69.26	71.49	73.92	73.85	75.58	75.47	19.34
Germany	51.58	61.49	64.88	65.43	66.89	73.57	71.52	73.49	75.26	23.68
France	73.06	77.43	79.59	73.27	73.92	75.49	77.55	78.03	78.71	5.65
Ireland	92.41	91.70	92.83	94.07	95.88	97.13	96.98	96.81	97.23	4.82
Italy	67.01	76.00	76.00	78.22	78.59	80.27	82.04	81.80	83.02	16.01
Luxembourg	71.88	66.67	72.09	78.26	80.95	84.62	82.35	81.25	83.56	11.68
Netherlands	84.23	86.29	87.95	87.13	87.13	88.30	88.89	89.58	89.23	5.00
UK	83.60	85.65	86.69	88.10	88.85	90.71	91.42	91.13	90.86	7.26
Greece	N.A.	75.34	78.30	79.48	79.89	78.64	80.70	82.86	83.34	8.00
Spain	N.A.	N.A.	N.A.	N.A.	73.53	81.28	84.38	82.40	83.41	9.88
Portugal	N.A.	N.A.	N.A.	N.A.	27.83	48.03	50.13	53.08	57.16	29.33[b]
EC/EU-9 Average	67.88	74.99	76.34	76.53	77.32	79.63	80.86	81.18	83.6	
EC/EU-12 Average	N.A.	N.A.	N.A.	N.A.	73.19	77.47	79.43	79.77	81.37	

Source: Eurostat. 1998. Agriculture Statistical Yearbook. Luxembourg: Office des publications officialles de Communautés europeéennes. Table 4.6 Holdings by Type of Farming, pp. 130-32.

Little evidence exists in the raw data of a transition from productivism to post-productivism between 1975 and 1997 in the EC/EU. However, increases in specialization did not occur smoothly over the twenty years. For the original nine members of the EC, the largest increase in specialization (approximately 7% of a total of 13%) occurred early in the study period, between 1975 and 1980. For Greece, Spain and Portugal, the largest increases occurred in the period immediately after joining the EC.

The national model has an R^2 of 0.99 and is significant at $\alpha = 0.05$. Belgium acts as the numeraire for the EC/EU 12 countries and 1980 acts as the numeraire for the temporal analysis. In this and subsequent models, the intercept represents change across all regions and time periods, thus it is the central focus of analysis. In the national model, the intercept is positive, but not significantly different from zero. This indicates that while on average increases in specialization occurred across the study period, this increase was either insignificant or highly spatially and temporally variant. The high standard error associated with the constant, as compared with other variables in the model, favors the last explanation. The parameter associated with the lagged form of the dependent variable is significant at $\alpha = 0.05$ and has the value 1.036 as expected.

Examination of the individual countries indicates that, with the exception of Portugal, which specialized very rapidly after joining the EC/EU, the remaining members of the EC/EU did not behave differently with respect to one another during the study period (Table 2). This conclusion may be read two ways. Either the level of specialization at the beginning of the study period was relatively uniform and stayed that way, or EC/EU agricultural policy has had a relatively uniform affect on the EC/EU nations. A glance at Table 1 indicates that the former is not true – specialization varied across nations by approximately 30% in 1975, thus it appears that the effect of EC/EU agricultural policy is, at the national level at least, relatively uniform. The result for Portugal is also unsurprising. Between entry into the EC/EU and the end of the study period, the percentage of specialized farms in Portugal rose from 28% to 53%. Nevertheless, it still lagged average EC/EU specialization by almost 30%.

Results with respect to time paint a picture of a slowing of increase in, if not an outright decrease in specialization after 1985. Using change in specialization between 1975 and 1980 as the numeraire, growth in specialization declined significantly at the $\alpha = 0.05$ level in 1983-85 and 1990-95. The significant decline in growth of specialization in the period 1983-85 can be tied to the first round of reforms to the Common Agricultural Policy (CAP) in 1984. These reforms set limits to the total subsidy amount, placed quotas on milk production and introduced set-asides. The decline in growth of specialization in the period 1990-95 can similarly be related to the McSharry Reforms to the CAP in 1992. The reforms introduced direct compensation to farmers, and further incentivized set-asides, environmentally sound farming, retirement of farmers, and reforestation. The reforms also set production quotas on the production of livestock and grains.

In addition, there was smaller (but significant at the $\alpha = 0.10$ level) decline in the growth of specialization in 1985-87 and 1995-97. Additionally, growth in specialization in the period 1980-83 was less than that in the period prior to 1980. Indeed there was only one time period in which the increase in specialization matched or exceeded the 1975-80 period and that occurred in 1987-90 which coincided with the period immediately after Spain and Portugal joined the EC/EU.

Table 2: Results of the Country-Level Analysis

$R^2 = 0.989$ Adjusted $R^2 = 0.986$ $F(19,76) = 358.10$ Prob. Value = 0.000

Variable Name	Coefficient	Standard Error	t-statistic	Prob. Value
Intercept	.845	1.861	0.45	0.651
Lag	1.036	.023	44.71	0.000**
Belgium	Numeraire			
Denmark	0.787	1.481	0.63	0.597
Germany	1.423	1.487	0.96	0.341
France	-1.185	1.479	-0.80	0.426
Ireland	-1.954	1.559	-1.25	0.214
Italy	0.060	1.481	0.04	0.968
Luxembourg	-0.473	1.480	-0.32	0.750
Netherlands	-1.670	1.512	-1.10	0.273
United Kingdom	-1.418	1.518	-0.93	0.353
Greece	-0.654	1.480	-0.44	0.660
Spain	0.620	1.664	0.37	0.710
Portugal	3.685	1.889	1.95	0.055*
1980	Numeraire			
1983	-0.794	1.224	-0.65	0.519
1985	-2.628	1.234	-2.13	0.036**
1987	-2.145	1.236	-1.73	0.087*
1990	0.786	1.301	0.60	0.547
1993	-2.734	1.341	-2.04	0.045**
1995	-3.081	1.350	-2.28	0.025**
1997	-2.687	1.355	-1.98	0.051*

** Significant at $\alpha = 0.05$
* Significant at $\alpha = 0.10$
Source: The author.

THE REGIONAL-LEVEL ANALYSIS

At the regional level, the total number of farm holdings declined most dramatically in Canarias, Spain (-48.5%), Comunidad de Madrid, Spain (-38.1%), Corse, France (-36.9%), Lisboa e Vale do Tejo, Portugal (-35.1%), and Algarve, Portugal (-38.9%). The number of farm holdings increased in very few regions. Only Scotland (10.1%) experienced double-digit growth in farm holdings. The greatest increases in specialization at the regional level in the EC/EU occurred in Dytiki Makedonia, Greece (10.5%), Voreio Aigaio, Greece (13.0%), La Rioja, Spain (10.6%), Molise, Italy (12.7%), Portugal Norte (13.9%) and the Açores, Portugal (12.6%). The greatest declines in specialization at the regional level occurred in Principado de Asturias, Spain (-11.6%) and Galicia, Spain (-13.4%). In Principado de Asturias, decline in specialized farming appears to be the result of a conversion from specialized to generalized agriculture, while in Galicia, the decline is part of an overall decline in the importance of farming (see Figure 1).

The regional model has the form:

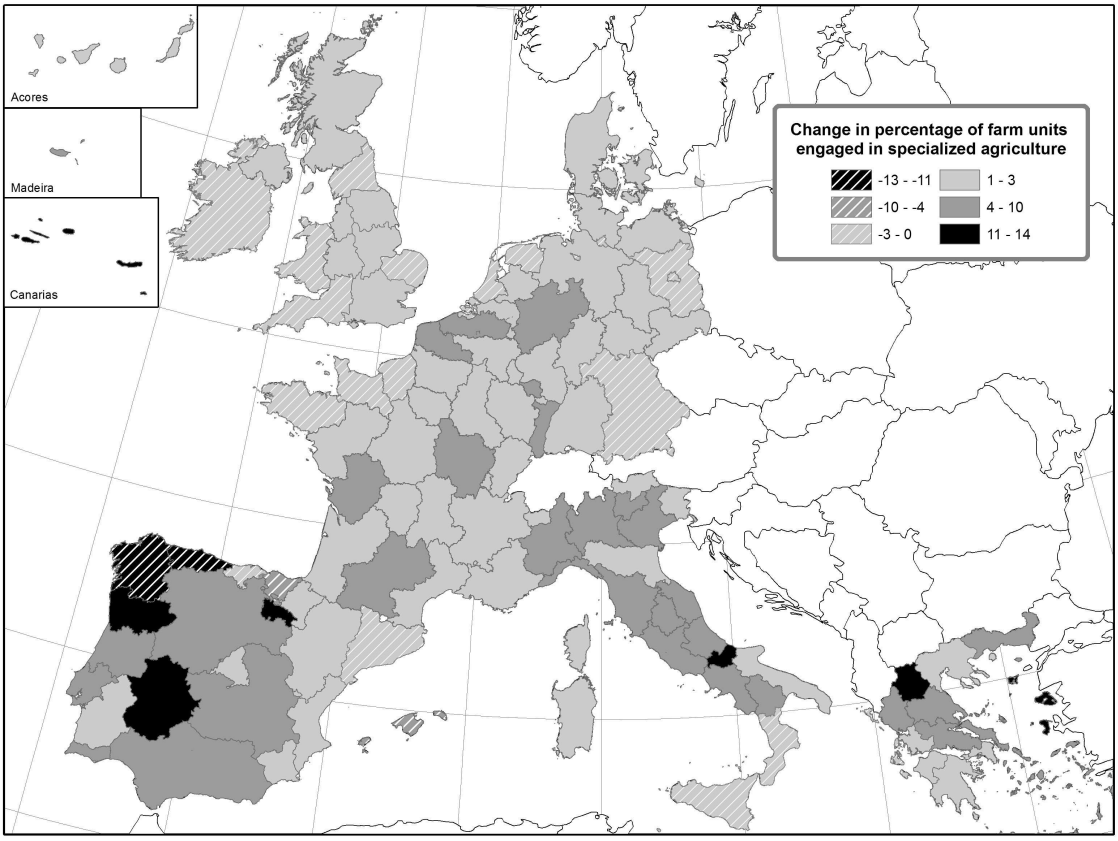
$$F^{c,r_k} = a + rF^{c,r_{k-1}} + bD^c$$

where F^{c,r_k} denotes the percentage of specialized farms in country c and region r at time k, $F^{c,r_{k-1}}$ denotes the number of specialized farms in country c and region r in the previous time period, D^c is a dummy variable denoting country, T_k is a dummy variable denoting time k, G^r is a dummy variable denoting region, and E^{c,r_k} is a normally distributed error term.

The calibrated model has an R^2 of 0.97 (and an adjusted R^2 of 0.95) and is significant at $\alpha = 0.05$ (see Table 3). The parameter associated with the lagged form of the dependent variable is significant at $\alpha = 0.05$ and has the value 1.003 as expected. As with the country model, Belgium acts as the numeraire for the EC/EU 12 countries, but here 1993 acts as the numeraire for the temporal analysis. Additionally, one NUTS region is dropped from the analysis for countries that have multiple NUTS regions. Countries that are NUTS regions (e.g. Denmark, Ireland, and Luxembourg) are also dropped.

In the regional model, the intercept, which represents change across all regions and time periods, is positive, but not significantly different from zero, indicating that while on average increases in specialization occurred across the study period, this increase was either insignificant or was highly spatially and temporally variant. In this case, low variation, when compared with other variables in the model, favors the former explanation. Indeed, with the exception of Spain, which as a country experienced declines in specialization during the period 1993-1995 and very little increased specialization throughout the 1990s and in which considerable variation existed in specialization at the regional level, there is no significant difference across the EC/EU throughout the 1990s. At first blush, this result makes little sense. However, the regional data does not encompass the entire study period, but rather simply 1993-97. During this time period, the model simply indicates that there was not significant change in the degree of specialization in the EC/EU. A close analysis of the temporal parameters of the country-level model (Table 2) shows this to be the case, since the parameters associated with years 1993, 1995 and 1997 are not significantly different from one another (see Knudsen 1992).

Figure 1: Change in percentage of farm units engaged in specialized agriculture, 1990-1997



Source: Eurostat. 2004. *Regions Statistical Yearbook.* Luxembourg: Office des publications officielles des Communautés européennes. Table 4.0: 130-133. (Map by Shanon Donnelly)

Table 3: Results of the Regional-Level Analysis

$R^2 = 0.968$ Adjusted $R^2 = 0.951$ F(116,225) = 58.18 Prob. Value = 0.000

Variable Name	Coefficient	Standard Error	t-statistic	Prob. Value	
Constant	0.984284	2.465102	0.4	0.69	
Lag	1.002797	0.0218143	45.97	0	**
Belgium	Numeraire				
Denmark	Dropped				
Germany	0.7918254	2.726389	0.29	0.772	
Greece	0.5080723	2.654287	0.19	0.848	
Spain	-5.001492	2.659794	-1.88	0.061	*
France	-0.3243582	2.657519	-0.12	0.903	
Ireland	Dropped				
Italy	-0.4943677	2.660711	-0.19	0.853	
Luxembourg	Dropped				
Netherlands	-0.4718418	2.641824	-0.18	0.858	
Portugal	0.4180902	2.638106	0.16	0.874	
United Kingdom	-0.7504611	2.648265	-0.28	0.777	
1993	Numeraire				
1995	-0.2706235	0.436439	-0.62	0.536	
1997	0.1915622	0.4364905	0.44	0.661	
BE1&2 Région Bruxelles	Numeraire				
BE3 Région Wallonne	-0.3832762	2.638787	-0.15	0.885	
DK Danmark	-0.6720244	2.635696	-0.25	0.799	
DE1 Baden-Württemberg	-1.611148	2.702048	-0.6	0.552	
DE2 Bayern	-2.150442	2.727442	-0.79	0.431	
DE3,90,5&6 Hamburg,Bremen,Berlin	-0.7342156	2.664743	-0.28	0.783	
DE4 Brandenburg	Dropped				
DE7 Hessen	-0.7891767	2.665777	-0.3	0.767	
DE8 Mecklenburg-Vorpommern	1.539206	2.636338	0.58	0.56	
DE9 Niedersachsen	-0.9390789	2.701923	-0.35	0.728	
DEA Nordrhein-Westfalen	-0.5841784	2.679025	-0.22	0.828	
DEB Rheinland-Pfalz	-1.457299	2.7632	-0.53	0.598	
DEC Saarland	-0.2229172	2.688231	-0.08	0.934	
DED Sachsen	2.389416	2.63659	0.91	0.366	
DEE Sachsen-Anhalt	0.9420827	2.636468	0.36	0.721	
DEF Schleswig-Holstein	-1.250594	2.782172	-0.45	0.654	
DEG Thüringen	2.597818	2.635708	0.99	0.325	
GR11 Anatoliki Makedonia, Thraki	0.2299275	2.692404	0.09	0.932	
GR12 Kentriki Makedonia	-0.5789725	2.679267	-0.22	0.829	
GR13 Dytiki Makedonia	1.833695	2.647181	0.69	0.489	

GR14 Thessalia	-0.344556	2.687602	-0.13	0.898	
GR21 Ipeiros	0.0087259	2.639442	0	0.997	
GR22 Ionia Nisia	-2.100542	2.690781	-0.78	0.436	
GR23 Dytiki Ellada	-0.8144483	2.647932	-0.31	0.759	
GR24 Sterea Ellada	0.4953129	2.646781	0.19	0.852	
GR25 Peloponnisos	-0.7031003	2.700262	-0.26	0.795	
GR3 Attiki	-0.8243806	2.701438	-0.31	0.761	
GR41 Voreio Aigaio	2.642712	2.670935	0.99	0.324	
GR42 Notio Aigaio	Dropped				
GR43 Kriti	0.6317799	2.685058	0.24	0.814	
ES11 Galicia	Dropped				
ES12 Principado de Asturias	-0.662659	2.689867	-0.25	0.806	
ES13 Cantabria	3.947257	2.739788	1.44	0.151	
ES21 Pais Vasco	2.387515	2.678466	0.89	0.374	
ES22 Comunidad Foral de Navarra	4.422564	2.681616	1.65	0.1	*
ES23 La Rioja	7.375265	2.660954	2.77	0.006	**
ES24 Aragón	4.760442	2.682598	1.77	0.077	*
ES3 Comunidad de Madrid	3.993242	2.715289	1.47	0.143	
ES41 Castilla y León	6.536207	2.675155	2.44	0.015	**
ES42 Castilla-La Mancha	5.385632	2.680608	2.01	0.046	**
ES43 Extremadura	7.119438	2.666705	2.67	0.008	**
ES51 Cataluña	3.759187	2.684087	1.4	0.163	
ES52 Comunidad Valenciana	4.579648	2.738403	1.67	0.096	*
ES53 Baleares	2.688677	2.638317	1.02	0.309	
ES61 Andalucía	5.901691	2.70646	2.18	0.03	**
ES62 Murcia	4.084059	2.71227	1.51	0.134	
ES7 Canarias	4.434265	2.662779	1.67	0.097	*
FR1 Île de France	-0.5759368	2.635593	-0.22	0.827	
FR21 Champagne-Ardenne	-0.6097323	2.639024	-0.23	0.817	
FR22 Picardie	-0.2886132	2.651631	-0.11	0.913	
FR23 Haute-Normandie	-0.9490507	2.648108	-0.36	0.72	
FR24 Centre	-0.2838683	2.659095	-0.11	0.915	
FR25 Basse-Normandie	-0.9137536	2.635885	-0.35	0.729	
FR26 Bourgogne	0.4351093	2.649282	0.16	0.87	
FR3 Nord-Pas-de-Calais	0.8409687	2.684558	0.31	0.754	
FR41 Lorraine	-0.0995803	2.699608	-0.04	0.971	
FR42 Alsace	1.110032	2.65186	0.42	0.676	
FR43 Franche-Comté	0.129924	2.645544	0.05	0.961	
FR51 Pays-de-la-Loire	-0.1771887	2.661845	-0.07	0.947	
FR52 Bretagne	-1.549034	2.660591	-0.58	0.561	
FR53 Poitou-Charentes	1.051656	2.695303	0.39	0.697	
FR61 Aquitaine	0.2315712	2.672982	0.09	0.931	
FR62 Midi-Pyrénées	1.429328	2.677298	0.53	0.594	
FR63 Limousin	-0.089657	2.63945	-0.03	0.973	
FR71 Rhône-Alpes	-0.1212728	2.660625	-0.05	0.964	
FR72 Auvergne	0.0442938	2.639305	0.02	0.987	
FR81 Languedoc-Roussillon	Dropped				
FR82 Provence-Alpes-Côte d'Azur	0.2042115	2.638536	0.08	0.938	

FR83 Corse	0.0755839	2.639178	0.03	0.977
IE Ireland	-1.180274	2.675551	-0.44	0.66
IT11 Piemonte	1.200596	2.648181	0.45	0.651
IT12 Valle d'Aosta	0.3328304	2.656148	0.13	0.9
IT13 Liguria	1.291251	2.65593	0.49	0.627
IT2 Lombardia	0.927468	2.639527	0.35	0.726
IT311 Bolzano-Bozen	Dropped			
IT312 Trento	0.627	2.640415	0.24	0.813
IT32 Veneto	1.522101	2.650925	0.57	0.566
IT33 Friuli-Venezia Giulia	-0.4337755	2.64795	-0.16	0.87
IT4 Emilia Romagna	-0.4432634	2.645894	-0.17	0.867
IT51 Toscana	1.221973	2.662784	0.46	0.647
IT52 Umbria	1.998479	2.692103	0.74	0.459
IT53 Marche	1.06298	2.664635	0.4	0.69
IT6 Lazio	1.342468	2.659871	0.5	0.614
IT71 Abruzzi	1.638038	2.675938	0.61	0.541
IT72 Molise	3.577868	2.7117	1.32	0.188
IT8 Campania	0.6378807	2.649413	0.24	0.81
IT91 Puglia	-0.1871217	2.636	-0.07	0.943
IT92 Basilicata	1.761476	2.690458	0.65	0.513
IT93 Calabria	-1.084955	2.64745	-0.41	0.682
ITA Sicilia	-0.7823677	2.639813	-0.3	0.767
ITB Sardegna	0.0924311	2.649434	0.03	0.972
LU Luxembourg	-0.4246102	2.639507	-0.16	0.872
NL1 Noord-Nederland	-0.8107731	2.644531	-0.31	0.759
NL2 Oost-Nederland	-0.2241842	2.635968	-0.09	0.932
NL3 West-Nederland	-0.7330919	2.642914	-0.28	0.782
NL4 Zuid-Nederland	Dropped			
PT11 Norte	3.149121	2.705896	1.16	0.246
PT12 Centro (P)	1.290308	2.724443	0.47	0.636
PT13 Lisboa e Vale do Tejo	0.5428612	2.635653	0.21	0.837
PT14 Alentejo	-0.9477345	2.635926	-0.36	0.72
PT15 Algarve	Dropped			
PT2 Açores	2.658153	2.640345	1.01	0.315
PT3 Madeira	1.250262	2.653083	0.47	0.638
UK1 North	-0.3151095	2.637277	-0.12	0.905
UK2 Yorkshire and Humberside	-0.2016611	2.635562	-0.08	0.939
UK3 East Midlands	-0.174779	2.635616	-0.07	0.947
UK4 East Anglia	-0.3293724	2.635746	-0.12	0.901
UK5 South East (UK)	-0.166971	2.635581	-0.06	0.95
UK6 South West (UK)	-0.6954344	2.636386	-0.26	0.792
UK7 West Midlands	Dropped			
UK8 North West (UK)	-0.1986864	2.638262	-0.08	0.94
UK9 Wales	-0.575391	2.642937	-0.22	0.828
UKA Scotland	0.3032529	2.635574	0.12	0.908
UKB Northern Ireland (UK)	-0.2749382	2.638765	-0.1	0.917

** Significant at $\alpha = 0.05$
* Significant at $\alpha = 0.10$
Source: The author.

A detailed examination of the Spanish regions reveals that, among them, La Rioja, Extremadura, Castilla-La Mancha, Castilla y León, Andalucía (all $\alpha = 0.05$), Communidad Foral de Navarra, Aragón, Communidad Valenciana and Canarias (all $\alpha = 0.1$) specialized significantly more rapidly than Principado de Asturias and Galicia. Thus, the notion that Spain is specialized at a slower rate than the rest of the EC/EU in the 1990s, may easily be the result of the decline in specialization in two Spanish regions, Principado de Asturias (13.41% decline in the period 1990-1997) and Galicia (11.63% decline in the period 1990-1997). Indeed, these are the largest declines in specialization of any of the NUTS regions in Europe during the 1990s, the next largest, a 4.29% decline, occurring in Pais Vasco, Spain.

CONCLUSIONS

As illustrated by the parameters associated with time in Table 2, the central finding of this research is that, at the national scale, specialization in European agriculture slowed after 1980. The exception to this general rule occurs in the period 1987-90, the period immediately after Spain and Portugal joined the EC/EU. Importantly, growth in specialization slowed immediately after changes to the CAP in 1984 and 1992, implying that these policies did, to some extent, work as expected. Among EC/EU countries, specialization slowed most dramatically in Ireland, the United Kingdom and the Netherlands, while specialization continued apace in Germany and Denmark, and the most recent entrants to the EC/EU, Portugal and Spain.

When examined at the regional scale in the period 1990-1997 change in specialization is insignificant EC/EU-wide. Comparison of Table 2 with Table 3 shows that this is an entirely consistent result since there is an insignificant difference in the parameters associated with the years 1993, 1995 and 1997 in Table 2. Among countries in the EC/EU during the 1990s, Spain appears to be an anomaly. Detailed analysis of Spain reveals that this anomalous behavior is primarily the result of a reversal in the trend toward specialization in the period 1993-1995 and the relatively slow rate of specialization in Principado de Asturias and Galicia.

There is now a wealth of literature on post-productivist shift in European agriculture. To date, there have been only a handful of empirical studies of the phenomenon. Previous empirical research on specialization in European agriculture is open to criticism on methodological grounds. This research uses different methods, different data, and a different time frame to arrive at essentially the same conclusions as previous empirical studies. The similarity in results of this research with the previous empirical studies suggests that, while there is merit in the claim that the era of productivism is at an end, current change in European agriculture, as most critics of post-productivism have suggested, is far more complex than the literature on post-productivist transition would have us believe. Clearly, changes in EC/EU agricultural policy have slowed the specialization of European agriculture. Indeed, it is the rare region that continues to specialize at a rapid rate into the late 1990s. The exact source of the decline in the rate of specialization is more difficult to pin down. It would appear that the proponents of post-productivism are correct in stating that the various moves by the EC/EU to limit production and to create environmentally-friendly agriculture in Europe have had a great deal to do with the slowing of specialization. However, the degree to which other attributes of post-production -- growing exurbanization in parts of Europe, the growth of organic farming, and the blossoming of localized production focused on wholesomeness and quality -- have contributed to a slowing of specialization is more difficult to judge.

REFERENCES

Arce, A. and Marsden, T. 1993 The social construction of international food: A new research agenda. *Economic Geography* 69(3): 293-311.

Argent, N. 2002 From pillar to post? In search of the post-productivist countryside in Australia. *Australian Geographer* 33(1): 97-114.

Barlas, Y., Dianos, D., Dimara, E., Kasimis, C., and Skuras, D. 2001 Factors influencing the integration of alternative farm enterprises into the agro-food system. *Rural Sociology* 66(3): 342-358.

Barnard, B. 1999a Euro farm reform: Will Brussels cap the CAP? *Europe* September 1999: 10-12.

Barnard, B. 1999b The corporate food chain. *Europe* September 1999: 13.

Barrett, R.H., Ilbery, B.W., Browne, A.W. and Binns, T. 1999 Globalization and the changing networks of food supply: The importation of fresh horticultural produce from Kenya into the UK. *Transactions of the Institute of British Geographers* NS 24(2): 159-174.

Berzeg, K. 1978 The empirical content of shift-share analysis. *Journal of Regional Science* 18(3): 463-469.

Berzeg, K. 1984 A note on statistical approaches to shift-share analysis. *Journal of Regional Science* 24(2): 277-285.

Bishop, Y.M.M., Feinberg, S.E. and Holland, P.W. 1975 *Discrete Multivariate Analysis: Theory and Practice.* Cambridge, MA: MIT Press.

Bowler, I.R. 1987 The regional restructuring of production in capitalist agriculture. *Rural Systems* 5(1): 17-25.

Bower, I.R. and Ilbery, B.W. 1987 Redefining agricultural geography. *Area* 19(4): 327-332.

Bowler, I.R. and Ilbery, B.W. 1997 The regional consequences for agriculture of changes to the Common Agricultural Policy. In *CAP and the Regions*, edited by I.R. Bowler & C. Laurent, pp. 105-115. Paris: INRA Editions.

Bowler, I.R. and Ilbery, B.W. 1999 Agricultural land-use and landscape change under post-productivist transition: Examples from the United Kingdom. In *Land Use Changes and Their Environmental Impact in Rural Areas in Europe*, edited by R. Kroőnert, J. Baudry, I.R. Bowler and A. Reenberg, pp. 121-139. Carnforth, Lancs.: Parthenon Publishing Group.

Bradshaw, B. 2004 Plus c'est la meme chose? Questioning crop diversification as a response to agricultural deregulation in Saskatchewan, Canada. *Journal of Rural Studies* 20(1): 35-48.

Brouwer, F. and Lowe, P. 1998 CAP reform and the environment. In *CAP and The Rural Environment In Transition: A Panorama Of National Perspectives*, edited by F. Brower and P. Lowe, pp. 13-38. Wageningen, The Netherlands: Wageningen Pers.

Burton, R.J.F. 2004 Seeing through the 'good farmer's' eyes: Towards developing an understanding of the social symbolic value of 'productivist' behavior. *Sociologia Ruralis* 44(2): 195-215.

Cloke, P. and Goodwin, M. 1992 Conceptualizing countryside change: From post-Fordism to rural structured coherence. *Transactions of The Institute Of British Geographers* NS 17(3): 321-336.

Demossier, M. 2003 Rural France in Europe: New challenges. *Modern & Contemporary France* 1(3): 265-278.

Dohse, K., Jürgens, U. and Malsch, T. 1985 From "Fordism" to "Toyotaism"? The social organization of the labor process in the Japanese automobile industry. *Politics and Society* 14(2): 115-136.

Editors of Europe. 1999 European agriculture. *Europe* September 1999: 37-46.

Eurostat. 1998 *Agricultural Statistical Yearbook*. Luxembourg: Office des publications officielles des Communautés européennes. Table 4.0: 130-133.

Eurostat. 2004. *Regions Statistical Yearbook.* Luxembourg: Office des publications officielles des Communautés européennes. Table 4.0: 130-133.

Evans, N., Morris, C. and Winter, M. 2002 Conceptualizing agriculture: a critique of post-positivism as the new orthodoxy. *Progress in Human Geography* 26(3): 313-332.

Feinberg, S.E. 1981 *Analysis of Cross-Classified Data*. Cambridge, MA.: MIT Press.

Fischler, F. 1999 Interview. *Europe* November 1999: 18-19.

Fitzsimmons, M. 1986 The new industrial agriculture: The regional integration of specialty crop production. *Economic Geography* 62(4): 334-353.

Flowerdew, R. and Lovett, A. 1988 Fitting constrained Poisson regression models to interurban migration flows. *Geographical Analysis* 20(4): 297-307.

Flynn, A. and Marsden, T. 1992 Food regulation in a period of agricultural retreat: The British experience. *Geoforum* 23(1): 85-93.

Fotheringham, A.S. and Knudsen, D.C. 1987 *Goodness-of-Fit Statistics*. Norwich: Geo Books (CATMOG No. 46).

Franks, J., Lowe, P., Phillipson, J. and Scott, C. 2003 The impact of foot and mouth disease on farm business in Cumbria. *Land Use Policy* 20(2): 159-168.

Freidmann, H. and McMichael, P. 1989. Agriculture and the state system. *Sociologia Ruralis* 29(1): 93-117.

Goodman, D. 2004 Rural Europe redux? Reflections on alternative agro-food networks and paradigm change. *Sociologia Ruralis* 44(1): 3-16.

Goodman, D. and Redclift, M. 1991 *Refashioning Nature: Food, Ecology and Culture*. London: Routledge.

Grant, R. 1993 Against the grain: Agricultural trade policies of the US, the European Community and Japan at the GATT. *Political Geography* 12(3): 247-262.

Hamilton, P. 1985 Small farmers and food production in Western Europe. *International Social Science Journal* 37(3): 345-360.

Holmes, J. 2002 Diversity and change in Australia's rangelands: a post-productivist transition with a difference. *Transactions of the Institute of British Geographers* NS 27(3): 362-384.

Howden, P. and Vanclay, F. 2000 Mythologization of farming styles in Australian broadacre cropping. *Rural Sociology* 65(2): 295-310.

Ilbery, B., Maye, D., Kneafsey, M., Jenkins, T. and Walkley, C. 2004 Forecasting food supply chain developments in lagging rural regions: evidence from the UK. *Journal of Rural Studies* 20(3): 331-344.

Kiely, G. 2001 Crisis on Europe's farms. *Europe* April 2001: 25-27.

Knudsen, D.C. 1992 Generalizing Poisson regression: Including *a priori* information using the method of offsets. *The Professional Geographer* 44(2): 202-208.

Knudsen, D.C. 1987 Computer-intensive significance-testing procedures. *The Professional Geographer* 39(2): 208-214.

Knudsen, D.C. 2000 Shift-share analysis: Further examination of models for the description of economic change. *Socio-Economic Planning Sciences* 34(2): 177-198.

Knudsen, D.C. and Barff, R. 1991 Shift-share as a linear model. *Environment and Planning A* 23(3): 421-431.

Knudsen, D.C. and Hansen, F. 1999 Restructuring in the Danish pig industry. Paper presented at the European Studies Association Annual Meeting, October 25-29, Omaha, Nebraska.

Krause, A. 1999 The future of France's farms. *Europe* September 1999: 15-17.

Kristensen, L. 2001 Agricultural change in Denmark between 1982 And 1989: The appearance of post-productivism in farming? *Geografisk Tidsskift* 101: 77-86.

Kristensen, L.S., Thenail, C. and Kristensen, S.P. 2004 Landscape changes in agrarian landscapes in the 1990s: The interaction between farmers and the farmed landscape. A case study from Jutland, Denmark. *Journal of Environmental Management* 71(3): 231-244.

Kullback, S. and Leibler, R.A. 1951 On information and sufficiency. *Annals of Mathematical Statistics* 22(1): 78-86.

Le Heron, R. and Roche, M. 1996 Globalization, sustainability, and apple orcharding, Hawke's Bay, New Zealand. *Economic Geography* 72(4): 416-432.

Lowe, P., Murdoch, J., Marsden, T. and Flynn, A. 1993 Regulating the new rural spaces: The uneven development of land. *Journal of Rural Studies* 9(3): 205-222.

Marsden, T., Murdoch, J., Lowe, P., Munton, R. and Flynn, A. 1993 *Constructing the Countryside*. London: UCL Press.

Marsden, T., Munton, R., Ward, N. and Whatmore, S. 1996 Agricultural geography and the political economy approach: A review. *Economic Geography* 72(4): 361-375.

Mather, A.S. 2001 Forests of consumption: Postproductivism, postmaterialism and the postindustrial forest. *Environment and Planning C: Government and Policy* 19(2): 249-268.

McCullagh, P. and Nelder, J.A. 1983 *Generalized Linear Models*. London: Chapman and Hall.

McMichael, P. 1993 World food system restructuring under a GATT regime. *Political Geography* 12(3): 198-214.

Mora, R. and San Juan, C. 2004 Geographical specialization in Spanish agriculture before and after integration in the European Union. *Regional Science and Urban Economics* 34(3): 309-320.

Moran, W., Blunden, G. and Bradly, A. 1996 Empowering family farms through cooperatives and producer marketing boards. *Economic Geography* 72(2): 161-177.

Morris, C. and Evans, N. 1999 Research on the geography of agricultural change: Redundant or revitalized? *Area* 31(4): 349-358.

Murdoch, J., Marsden, T. and Banks, J. 2000 Quality, nature, and embeddedness: Some theoretical considerations in the context of the food sector. *Economic Geography* 76(2): 107-125.

Page, B. 1996 Across the great divide: Agricultural and industrial geography. *Economic Geography* 72(4): 376-397.

Phillips, F.Y. 1981 *A Guide to MDI Statistics for Planning and Management Model Building.* Austin: Institute for Constructive Capitalism.

Phillips, M. 2004 Other geographies of gentrification. *Progress in Human Geography* 28(1): 5-30.

Piore, M.J. and Sabel, C.F. 1984 *The Second Industrial Divide: Possibilities for Prosperity*. New York: Basic Books.

Rigg, J. and Ritchie, M. 2002. Production, consumption and imagination in rural Thailand. *Journal of Rural Studies* 18(4): 359-371.

Sporleder, T.L. and Goldsmith, P.D. 2001 Alternative firm strategies for signaling quality in a food system. *Canadian Journal of Agricultural Economics* 49(4): 591-606.

Statistisches Bundesamt. 1995 *Environmental Data, Germany, 1995*. Berlin: Hagedorn.

Ufkes, F.M. 1993a The globalization of agriculture. *Political Geography* 12(3): 194-197.

Ufkes, F.M. 1993b Trade liberalization, agro-food politics and the globalization of agriculture. *Political Geography* 12(3): 215-231.

van Huylenbroeck, G. and Whitby, M. eds. 1999 *Countryside Stewardship: Farmers, Polcies and Markets*. Oxford: Elsevier Sceince.

van Huylenbroeck, G. and Durand, G. eds. 2003 *Multifunctional Agriculture: A New Paradigm for European Agriculture and Rural Development*. Aldershot, Hamps.: Ashgate.

Van der Ploeg, J.D. 1990 *Labor, Markets, and Agricultural Production.* Boulder, Co.: Westview Press.

Van der Ploeg, J.D. and Frouws, J. 1999 On power and weakness, capacity and impotence: rigidity and flexibility in food chains. *International Planning Studies* 4(Oct): 333-347.

Van der Ploeg, J.D., Renting, H., Brunori, G., Knickel, K., Mannion, J., Marsden, T., De Roest, K., Sevilla-Guzmána E. and Ventura, F. 2000 Rural development: from practices and policies towards theories. *Sociologia Ruralis* 40(4): 391-408.

Van der Ploeg, J.D. and Van Dijk, G. eds. 1995 *Beyond Moderization: The Impact of Endogeneous Rural Development*. Assen, Netherlands: Van Gorcum.

Walford, N. 2003 Productivism is allegedly 'dead, long live productivism.' Evidence of continued productivist attitudes and decision-making in South-East England. *Journal of Rural Studies* 19(4): 491-502.

Wallace, I. 1985 Towards a geography of agribusiness. *Progress in Human Geography* 9(4): 491-514.

Ward, N. 1993 The agricultural treadmill and the rural environment in the post-productivist era. *Sociologia Ruralis* 33(3-4): 348-364.

Watts, D.C.H., Ilbery, B. and Maye, D. 2005 Making reconnections in agro-food geography: Alternative systems of food provision. *Progress in Human Geography* 29(1): 22-40.

Watts, M. 1995 The agrarian question in the late twentieth century development (or Kautsky redux). *Proceedings of the Conference on Spatial Dimensions of Development*. Copenhagen: University of Copenhagen.

Wilkie, R. 2005 Sentient commodities and productive paradoxes: The ambiguous nature of human-livestock relations in Northeast Scotland. *Journal of Rural Studies*. 21(2): 213-230.

Wilson, G.A. 2001 From productivism to post-productivism…and back again? Exploring the (un)changed natural and mental landscapes of European agriculture. *Transactions of the Institute of British Geographers* NS 26(1): 77-102.

Wilson, G.A. 2004 The Australian Landcare movement: towards 'post-productivist' rural governance? *Journal of Rural Studies* 20(4): 461-484.

Wilson, G.A. and Rigg, J. 2003 'Post-productivist' agricultural regimes and the South: Discordant concepts? *Progress in Human Geography* 27(6): 681-707.

Winter, M. 2003 Geographies of food: Agro-food geographies – making reconnections. *Progress in Human Geography* 27(4): 505-513.

Wonnacott, H. and Wonnacott, R.J. 1981 *A Second Course in Regression*. New York: Wiley.

Wormell, P. 1978 *The Anatomy of Agriculture: A Study of Britain's Greatest Industry*. London: Harper & Rowe.