

Agricultural Change and Population Movements in France 1892-1929*

By HILARY P M WINCHESTER

AGRICULTURAL development and population growth were both relatively stagnant in France during the late nineteenth and early twentieth centuries. Despite this stagnation, it is the contention of this paper that selective advances in agricultural change, combined with spatial variations in population growth, provided a spur to population migration. At a national level, significant differences in agricultural developments were evident between *départements* and regions; it is argued that the areas of more intensive agricultural production were better able to absorb labour, whereas areas of subsistence agriculture were more likely to shed labour.

The stagnation of agriculture at this time has been well documented and summarized.¹ The recovery of agricultural production after the French Revolution is traditionally dated from 1815 to 1870.² Data compiled from many sources indicate a steady increase in production from 1840 onwards.³ These increases may be associated with improved marketing networks, greater ease of transport and the growth of regional

agricultural specialization.⁴ Livestock productivity was raised as a result of improvements to grass lands, and the production of cereals was increased by the introduction of heavy ploughs.⁵ Chevalier⁶ has argued that scientific improvements in agriculture and changes in the social status of the peasantry were other factors contributing to the general increases in agricultural production.

Improvement during the second half of the nineteenth century was intermittent, cyclical and inequitably distributed throughout the country.⁷ Improvements spread from the core areas of the *grande culture* of the Paris basin and Alsace-Lorraine to reach most parts of the country by the 1890s. Pautard⁸ views the 1890s as a major turning point in French agricultural history; as the climax of the 'first agricultural revolution', which saw the decline of fallow land and the successful introduction of mixed farming.

I

The major data sources used are the agricultural enquiries of 1892 and 1929, which were the last of the so-called 'decennial' enquiries, held at irregular intervals from 1840. These enquiries

*The author is grateful for the helpful comments made on an earlier draft of this paper by two anonymous referees, and by Dr H D Clout, University College, London; Dr G M Robinson, University of Edinburgh; and Dr S J Gale, Cambridgeshire College of Arts and Technology.

¹ G M C Duby and A Wallon (eds), *Histoire de la France Rurale*, Paris, 1976, vols 3 and 4.

² G Léonce de Lavergne, *Economie Rurale de la France*, Paris, 1860; W H Newell, *Population Change and Agricultural Development in Nineteenth Century France*, unpub PhD thesis, University of Pennsylvania, 1971; J Pautard, *Les Disparités Régionales dans la Croissance de l'Agriculture Française*, Paris, 1965; E Weber, *Peasants into Frenchmen: the Modernisation of Rural France 1870-1914*, 1977.

³ J C Toutain, *Le Produit de l'Agriculture Française de 1700 à 1958: II — La Croissance*, Paris, 1961; Pautard, *op. cit.*

⁴ M Augé-Laribé, *La Politique Agricole de la France de 1880 à 1940*, Paris, 1950; R Price, *The Modernisation of Rural France*, 1983.

⁵ M Bloch, *Les Caractères Originaux de l'Histoire Rurale Française*, Oslo, 1931.

⁶ A Chevalier, *Révolution en Agriculture*, Paris, 1946.

⁷ J Chombart de Lauwe, *Bretagne et Pays de la Garonne; Evolution Agricole Comparée depuis un Siècle*, Paris, 1946; E Labrousse and F P Braudel (eds), *Histoire Economique et Sociale de la France*, Paris, 1970, vol 3.

⁸ Pautard, *op. cit.*

recorded successively greater amounts of information on crops, livestock and land use, as well as the rural economy, farm holdings, and a variety of agricultural improvements and machinery. The enquiries took the form of detailed questionnaires to mayors of *communes*, supervised by the prefect of the *département*. The aggregated data have been utilized by Toutain in his major analysis of national patterns of agricultural change from 1700.⁹ However, the departmental data have been relatively less used, because of their possible unreliability.¹⁰ Newell argues that they are internally consistent in, for example, the numbers of farm animals, applications of manure, crop yields and farm machinery in any given *département*.¹¹ Clout considers the quality of information to have improved gradually as measurements became standardized, and officials became adept at completing the questionnaires.¹² These data must nonetheless be treated as approximations, and only general conclusions can be drawn from them. For this reason, relatively simple statistical tests are preferred to more sophisticated techniques.

The classification of agricultural regions uses aggregations of the departmental statistics. Two basic measures of agricultural specialization are used; the area of cereal cultivation as a percentage of the total cultivated area, and a general livestock indicator. Cereals, which include wheat, oats, rye, and barley, account for most of the national vegetal production, the major exceptions being vines and potatoes. Vines are significant in specialized regions of France and are included in the second stage of the classification, as is market gardening. Vegetal production accounts for about three-quarters of agricultural production; the rest is accounted for by livestock. A generalized livestock indicator is preferred in

order to include all major livestock types; this indicator is the ratio of total livestock units to land. The cereals and livestock indicators are chosen for their importance and comprehensiveness; there are no problems of data comparability over the time-period 1892-1929. Indicators of agricultural improvement and agricultural machinery are not, however, consistently available in 1892 and 1929. The collection of statistics on these matters reflects their importance at the time. For example, in 1892, no data are available on the use of artificial fertilizers nor on the availability of tractors, as these were not yet in use. However, because of their importance in 1929 these are considered for the later period. The year 1892 is the last date when other types of machinery are recorded, for example waterwheels and windmills; these, however, are not considered in this paper.

Agricultural type areas and agricultural improvements are related to measures of population growth, and to population migration from rural areas. The demographic indicators are taken from the population censuses of 1891 and 1931, which are approximately contemporaneous with the agricultural censuses. The rate of natural population growth by *département* is used as an indicator of labour availability, and hence of possible pressure on resources. The rate of net migration is used as an indicator of labour loss, the assumption being that population pressure is felt first on levels of consumption and then on levels of employment. Out-migration is therefore a key indicator of this pressure. Net migration data are used, as gross migration data are not available for 1931. The measure of migration is refined by using migration from rural *communes* rather than migration from the whole *département*. Rural *communes* are defined by the census as those containing less than 2000 people in the *chef-lieu* of the *commune*; they were at this time predominantly agricultural in character. A general migration rate calculated for a whole *département* conceals

⁹ Toutain, *op cit.*

¹⁰ B Gille, *Les Sources Statistiques de l'Histoire de France*, Paris, 1964.

¹¹ Newell, *op cit.*

¹² H D Clout, *The Land of France, 1815-1914*, 1983.

in-migration to towns and out-migration from rural areas; out-migration from rural areas is therefore seen as a more representative measure of the loss of agricultural population.

II

The period 1892–1929 is generally regarded as an era of agricultural depression with minimal improvements in agricultural production (Fig 1). It is, however, a long and

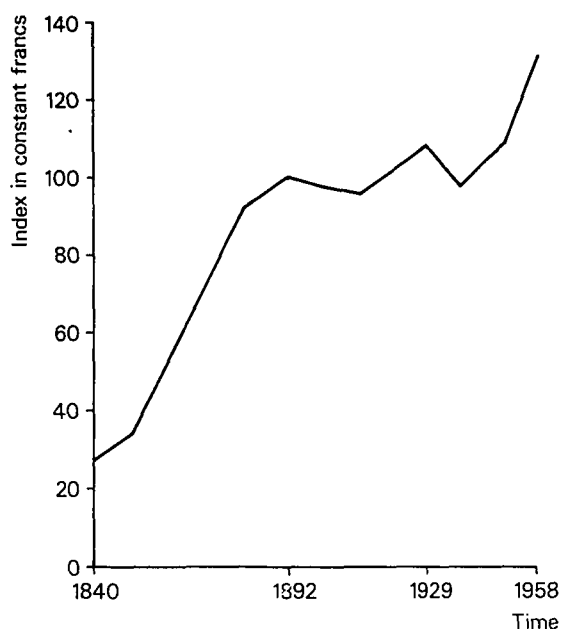


FIGURE I

Agricultural production: France, 1840–1958

complex period, which shows some evidence of agricultural improvement as well as stagnation, despite the severe disruptions of the Great War.¹³ Three major problems may be clearly identified: the phylloxera crisis which was still affecting areas of viticulture; the impact of protectionist policies and the competition from foreign grain producers; and the effects of the Great War, especially in northern France.

The phylloxera crisis affected vineyards of

southern France as early as 1862.¹⁴ Marginal production was severely affected but the great vineyards remained in operation. By the 1920s, however, a multiplicity of small vineyards had been re-established, and the opportunity to restructure viticulture was rapidly vanishing.¹⁵ The second problem, that of foreign corn imports, became evident before the Great War. This competition from abroad caused a substantial drop in corn prices. Labrousse *et al* have quoted average corn prices in 1880, at 22.85 francs per hectolitre; in 1900, 14.63 francs; in 1912, 20.23 francs.¹⁶ As with viticulture, those producers most severely affected by the fall in prices were the marginal farmers.¹⁷ The Méline tariffs of 1892, and subsequent protectionist policies, erected tariff barriers which fostered stagnation rather than stimulating increases in output. The stagnation was undoubtedly exacerbated by inadequate internal marketing structures.¹⁸ Thirdly, the Great War caused huge losses of life, property, livestock, production, and the devastation of vast areas of agricultural land.¹⁹ In the short term, foreign imports became necessary to offset the national shortfall in production, while in the long term a much-needed restructuring of some aspects of agriculture was stimulated.

Despite the major problems of agriculture at this time, there were notable indications of progress in four areas of agriculture: first, the spread of mechanization; secondly, the introduction of artificial fertilizers; thirdly, improvements in livestock breeding; and finally, changing patterns of land tenure and rural organization. However, these improvements were barely sufficient to maintain agricultural production at the level

¹⁴ I Stevenson, 'The diffusion of disaster: the phylloxera outbreak in the département of Hérault, 1862–80', *Journal of Historical Geography*, 6, 1980, pp 47–63.

¹⁵ J Lafforgue, *Gironde*, Departmental monograph of 1929 agricultural census, Bordeaux, 1937.

¹⁶ E Labrousse, R Romano and F G Dreyfus, *Le Prix du Froment en France au Temps de la Monnaie Stable (1726–1913)*, Paris, 1970.

¹⁷ E Rey, *L'Agriculture Progressive dans le Lot*, Cahors, 1908.

¹⁸ Augé-Laribé, *op cit*.

¹⁹ A Demangeon, *Le Déclin de l'Europe*, Paris, 1920.

¹³ Augé-Laribé, *op cit*; Duby and Wallon, *op cit*.

of 1892 (Fig 1) and they were both sporadic and localized in their occurrence.²⁰ The major development in agriculture was undoubtedly mechanization.²¹ The development of wheeled and heavy ploughs occurred in the more open spaces of the north, while simple wooden ploughs persisted in the uplands.²² Most specialized machinery, with the exception of threshing machines, did not become generally available until after 1918, when their adoption was facilitated by the development of tractors for draught purposes. By 1918, the adoption of specialized machinery, such as potato harvesters, reapers, and binders, had proceeded apace in areas of intensive agriculture. In areas of subsistence agriculture, however, adoption was slower, and where it did occur could co-exist with agricultural stagnation.²³

The second major development of the period was the spread of artificial fertilizers. Until the end of the nineteenth century, and in some cases later, fertilizers were in chronically short supply, and consisted mainly of animal manure, with locally important sources such as seaweed in coastal areas and night soil around large towns.²⁴ In the Seine-et-Marne, an area devoted to cereal monoculture, fertilizers were applied scientifically to maintain yields at commercial levels.²⁵ Elsewhere, however, chemical fertilizers became more widely available by the 1920s but were not always wisely applied; in particular sodium nitrate and other superphosphates were a popular choice with small farmers for their impressive but short-term results. Slight increases in cereal yields nationally are evident during this period. Yields of wheat rose from 15.7

hectolitres per hectare in 1892, to 22.1 hectolitres per hectare in 1929, while yields of rye rose from 15.3 to 17.1 hectolitres per hectare over the same period. This increase in yields may be attributed in large part to the increased use of artificial fertilizers, although other factors, such as better preparation of the soil by machinery, must also be taken into account.

A third major advance was the improvement of livestock breeding, facilitated by the introduction of artificial grasses for pasture and fodder in the nineteenth century. The 1880s saw the first introduction of herd-books for improved strains of cattle. Beef breeds of world quality emerged in the Charolais and Limousin districts as the result of careful selection, better feeding and pastures, and improved care and hygiene. Similarly, specialist dairy breeds were developed, such as the Normandy, and the Montbéliard of Savoie. In the poorer upland areas, however, the number of animals fell only slightly as peasant farmers still preferred a numerous herd to a quality one. In these areas, even by 1929, there had been almost no improvement in fodder, stabling or breeding. The main problem was that the native strains of cattle were expected to serve all purposes; for milk, manure, calves, meat, and as draught animals.

One final area of agricultural improvement was the gradual change which occurred in methods of land-holding, particularly the decrease in *métayage* or share-cropping, and a consequent increase in the number of tenant farmers. At the turn of the century, the proportion of farms held under share-cropping agreements nationally was only 7 per cent, but in areas of the south and west, about 25 per cent of farms were held under this form of tenure. *Métayage* had barely altered since the pre-Revolution era and was a system which usually militated against innovation and improvement.²⁶ The reduction of share-cropping agreements

²⁰ H Prince, 'Regional contrasts in agrarian structure', in H Clout (ed), *Themes in the Historical Geography of France*.

²¹ G Garrier, *Paysans du Beaujolais et du Lyonnais 1800-1970*, Grenoble, 1973, 2 vols; Clout, *op cit*.

²² Anon, *Haute-Loire*, Departmental monograph of 1929 agricultural census, Le Puy, 1937.

²³ Garrier, *op cit*.

²⁴ Lafforgue, *op cit*, quotes the use of both these sources around Bordeaux.

²⁵ Anon, *Seine-et-Marne*, Departmental monograph of 1929 agricultural census, Paris, 1938.

²⁶ J Renard, *Les Evolutions Contemporaines de la Vie Rurale dans la Région Nantaise*, Les Sables-d'Olonne, 1975.

continued gradually until 1946 when *métayage* was formally replaced by a *statut de fermage*. Other improvements in rural organization included the development of co-operatives, and a greater availability of credit facilities from the *Crédit Agricole*.²⁷ The *Service des Améliorations Agricoles*, established in 1903, helped to provide rural infrastructure, notably the introduction of mains electricity and the improvement of soils.

Therefore, the period 1892–1929 saw significant improvements in agriculture, but these were not always nationally widespread, nor consistent throughout the period. Agricultural production suffered severe setbacks, such that by 1929 agriculture was a lagging sector in the French economy. Disparities in regional structure and development indicated a clear socio-economic distinction between the commercially-orientated cereal growing of the north and the peasant polyculture of much of the rest of France.

III

Population growth in France is distinctive because of the very early decline in fertility. The peak rate of population growth occurred no later than the 1820s, and rural populations reached their peak of absolute numbers between 1851 and 1911. Nationally, population growth in the late nineteenth century was slow and steady, as birth and death rates closely paralleled each other and there was little immigration from abroad. Regionally, however, variations in the birth rate were very marked with very high rates observable in the Massif Central and in the west of France, especially Brittany.²⁸

Population movement was also regionally differentiated, the main flows occurring from rural areas towards Paris, and to other large cities. Permanent population movements from rural areas were preceded by a long tradition of temporary migrations for a variety of purposes including transhumance, harvest work, winter trading, artisanal employment and wet-nursing. The rural exodus affected women more than men, possibly because they bore the brunt of domestic discomfort.²⁹ Many of the causes which have been suggested for the rural exodus relate to the difficulties of rural and agricultural life. Caziot has suggested that small farmers were more susceptible to migration because of difficulties of inheritance; while Brunet and Vallarché have argued that *métayage* accelerates depopulation.³⁰ Goreux sees the movement as an economically-motivated migration towards areas of higher agricultural wages, although it is a slow response to rapid economic change.³¹ Other factors which facilitated this movement included improvements in transport, education and communications and the enforced mobility caused by military activity, conscription and war.³² The reasons for migration are not all negative and urban and industrial areas may exert a positive attraction, because of the wider employment opportunities and higher income levels attainable in industry and service employment, and the greater amenities and facilities available in the city. This paper, however, is primarily concerned with the relationships between rural out-migration on the one hand and agricultural structure and change on the other. It is recognized that migration motivation is complex, and involves urban attractions as

²⁷ A R H Baker, 'Ideological change and settlement continuity in the French countryside: the development of agricultural syndicalism in Loir-et-Cher during the late nineteenth century', *Journal of Historical Geography*, 6, 1980, pp 163–77.

²⁸ P Merlin, *L'Exode Rural*, Paris, 1971; P Hohenberg, 'Migration et fluctuations démographiques dans la France rurale 1836–1901', *Annales Economies Sociétés Civilisations*, 29, 1974, pp 461–97.

²⁹ L M Goreux, 'Les migrations agricoles en France depuis un siècle', *Etudes et Conjoncture*, 4, 1956, pp 327–75.

³⁰ J Caziot, *Une Solution au Problème Agraire: La Terre à la Famille Paysanne*, Paris, 1919; R Brunet, *Les Campagnes Toulousaines, Etude Géographique*, Toulouse, 1965; J Vallarché, *La Mobilité Professionnelle des Ruraux dans un Société Libre*, Fribourg, 1953.

³¹ Goreux, *op cit*.

³² Weber, *op cit*.

well as rural push factors; however, these are not the main focus of study.

The relationships between agricultural resources and population change have been the focus of many previous studies. In general terms, Sauvy *et al* see out-migration as a response to pressure on limited resources.³³ A preliminary response to pressure is the extension of the cultivated area, to provide food and employment; subsequent responses necessitate either changes in fertility, improvements in technology, or movements of population. It is this complex of responses which is the subject of this paper.

Newell considers that rural out-migration was a necessary response to population growth, as he believed there was very little scope for agricultural expansion by the mid-nineteenth century; out-migration was related to the number of new entrants into the labour force.³⁴ Hohenberg also recognized the relationship between population growth and out-migration and also established a positive relationship between agricultural density and out-migration. However, he considers a simple view of population pressure to be inadequate. In-migration is associated with low natural increase and also with areas of high agricultural productivity and high agricultural wages. In-migration to areas of low natural increase occurs because these areas have experienced parcellation of property, which acts as a check on fertility; in-migration in this case is a response by those wishing to acquire land. He therefore sees the decline in fertility as the motive force for rural migration. However, in-migration is also positively associated with advanced agricultural regions offering better salaries; migration here is seen as a response to wage differentials.³⁵ The situation is made even more complex as agricultural productivity is

only poorly related to net out-migration, with exceptionally heavy losses from the Massif Central and lower losses than expected from the west of France.

This paper focuses particularly on two aspects of this complex web of relationships. First, agricultural types and structures are related to out-migration, by using an agricultural regionalization based on departmental data. It is hypothesized that out-migration will be significantly different from the different agricultural regions, with areas of more intensive agriculture better able to retain their rural populations. Secondly, the well-established relationship between natural growth and out-migration is accepted and therefore attention is paid to the relationship between population pressure and technical change in agriculture. The second hypothesis to be examined is that areas of population growth, given their limited natural resources, would attempt to create further agricultural employment, primarily by extending the agricultural area. The converse of this, that areas of natural decline should adopt labour-saving improvements and machinery, is examined in the final section of this paper.

IV

The purpose of classifying agricultural regions was to delimit a number of areas exhibiting major differences in their agricultural specializations, which therefore would be likely to have different labour requirements. Cereals and livestock were used as the two basic criteria for classification of agricultural regions, rather than land-holding and field systems which have been the basis of previous classifications.³⁶ A simple cartesian graph of the two basic indices of cereals and livestock produced an initial four-fold classification of all the

³³ A Sauvy, G C Chez, P George and L Chevalier, *Dépeuplement Rural et Peuplement National*, Paris, 1949.

³⁴ Newell, *op cit*.

³⁵ Hohenberg, *op cit*, p 478.

³⁶ Prince, *op cit*, contains a review of these classifications.

départements of France (Fig 2). The results of this classification for 1892 are shown in Fig 3a, b, c, d. The areas in Fig 3a were characterized by a high proportion of land under cereal production and low livestock stocking rates; these were the commercial cereal growing areas of the Paris basin and Centre regions, together with the Garonne valley and the Vaucluse. Group b (Fig 3b) consisted of the predominantly upland areas which specialized in cattle- and sheep-rearing; these were confined to parts of the Massif Central, the Pyrenees and Normandy.

In group c (Fig 3c) the areas with low scores on both cereals and livestock were categorized as areas of subsistence polyculture, where the terrain or the agricultural techniques employed were able to support only a low level of agricultural production. These départements were the highland areas of the Jura and the Alps, the poor soil regions of the Orne, the Nièvre (the Morvan) and the Landes. The areas of below-average agricultural production also included the coasts of Languedoc and Provence. On the other hand, the areas of group d (Fig 3d), which supported both a high proportion of land under cereals and a high livestock

stocking rate, were designated as areas of intensive polyculture. These areas were those of the west coast from the Nord to the Vendée, and included all of Brittany, parts of the Loire Valley and the northern Massif Central.

The initial classification of agricultural regions on the basis of the relative importance of cereals and livestock in the farming system, of necessity had excluded other factors of possible significance to the overall level of agricultural production and to the regional requirements for an agricultural labour force. Three such indicators were considered further: the average size of farm unit; the relative importance of market gardening; and the relative importance of viticulture. The presence of large numbers of small farms, market gardens and vineyards may have indicated a higher requirement for labour than expected from the initial cereal/livestock classification. The agricultural labour force, that is the number of workers employed per 100 hectares of cultivated land, was also considered as the basis for further sub-division. In three of the four initial agricultural regions, sub-divisions have been proposed on the basis of these further characteristics, the validity of which were assessed using Mann-Whitney U-tests.

In group a, the cereal region, the proposed sub-division was between the contiguous northern départements, normally considered to be the area of *grande culture* on the one hand, and on the other the south-western départements which contained a greater proportion of vineyards and consisted of predominantly smaller farms; these areas were termed 'cereals with vines'. The livestock category, group b, showed no apparent anomalies. In the subsistence polyculture category, group c, the départements of the Mediterranean littoral could be distinguished by their small size of farm and also by the high proportion of the cultivated areas taken up by market gardens and vineyards. This suggested a distinctive

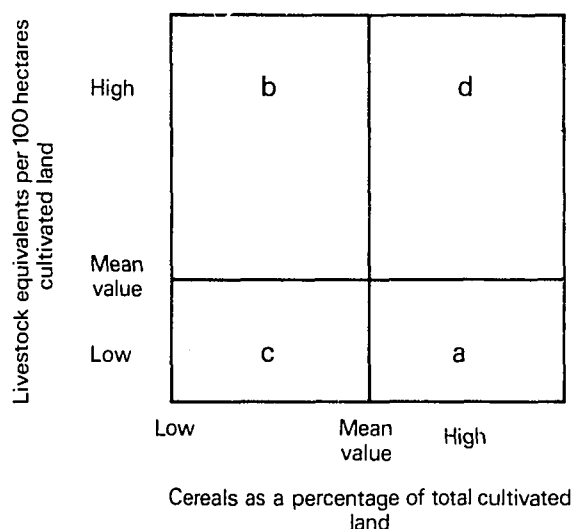
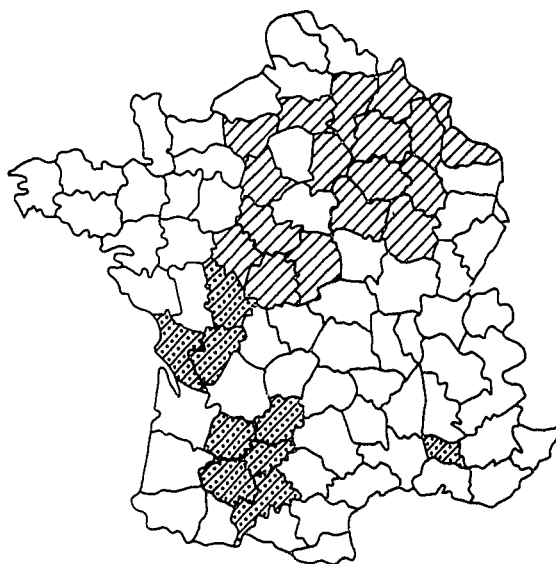


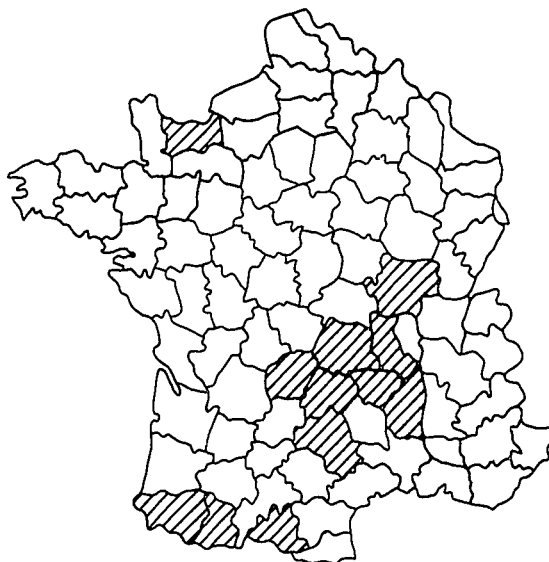
FIGURE 2
Method of classification of agricultural areas

1892

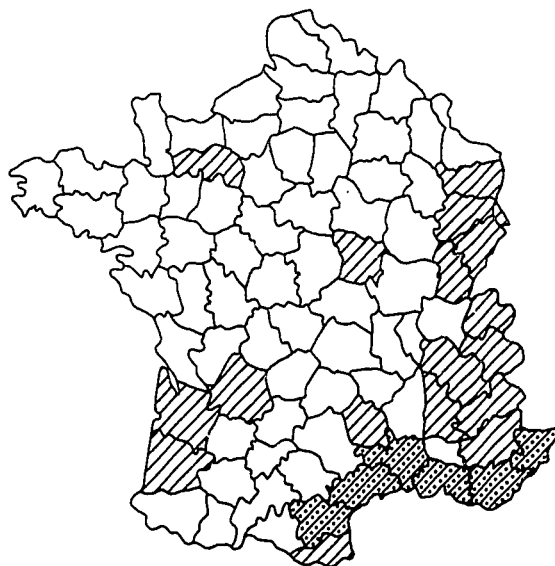
Cereals/cereals with vines



Livestock



Subsistence polyculture/southern agriculture



Intensive polyculture/urban agriculture

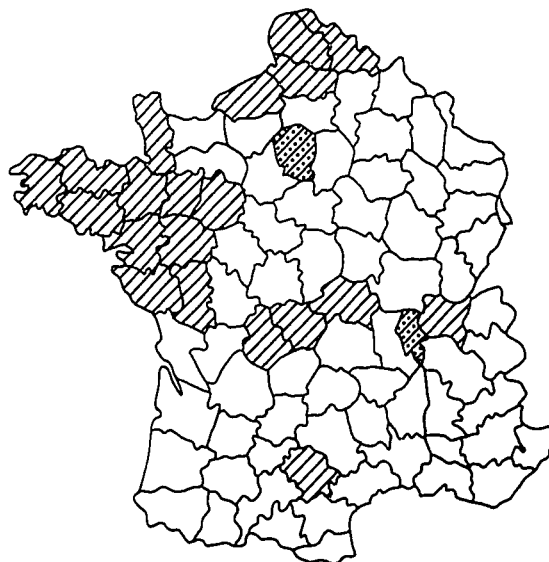


FIGURE 3
Agricultural regions 1892

and more intensive type of agriculture, which was essentially different in character from the subsistence farming of the higher mountain regions; this was termed 'southern agriculture'. The intensive polyculture category contained two *départements* of exceptionally small farms (an average 3.0 ha compared to a national average of 8.7 ha), which were also characterized by a very high preponderance of market gardening. These two *départements* of Seine and Rhône were also distinguished by their very low rates of employment in agriculture compared to other sectors of the economy. The agriculture of Seine and Rhône was relatively intensive, influenced by the proximity of the major cities of Paris and Lyon, and these *départements* were considered as areas of 'urban agriculture'.

The proposed sub-divisions were tested for internal homogeneity using Mann-Whitney U-tests between each major group and its sub-division, on the basis of size of farm, proportion of vineyards, proportion of market gardens and intensity of agricultural labour. The Mann-Whitney U-test is a non-parametric, 95 per cent power-efficient test which tests the significance of differences between groups. In each case the test applied was one-tailed, specifying that the expected difference was smaller in the case of farm size, but greater in the other three instances: thus separating from the

initial division *départements* with smaller but more intensive and diverse type of holdings. These sub-divisions would therefore be expected to have a greater requirement for agricultural labour than their parent groupings.

The results of the tests are shown in Table 1. In most cases the results are highly significant, there being only one in a thousand chances that the differences could have occurred at random. For 1892, therefore, seven agricultural regions were delimited (Fig 3). The initial four-fold classification of livestock, cereals, subsistence polyculture and intensive polyculture was maintained, together with sub-divisions of the latter three categories, that is, cereals with vines, southern agriculture and urban agriculture.

The same classification procedure was followed for 1929, to delimit areas on a consistent basis, rather than maintaining constant areas over time. The four main classes were established using the cereals and livestock indices, and the same sub-divisions using the same intensity measures. The validity of these groupings was again assessed using Mann-Whitney U-tests. The U-values were diminished in significance in some cases, particularly in the case of cereals/cereals with vines, but the significance levels were still acceptable (Table 1).

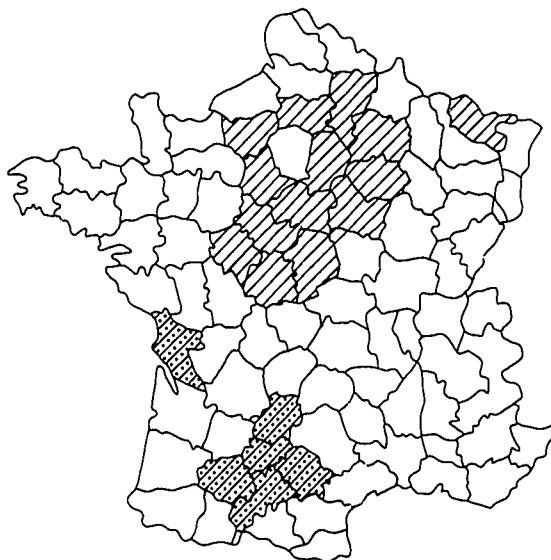
TABLE I
Significance Levels for Agricultural Sub-divisions 1892 and 1929

Major group/Sub-division		Indicators of Intensive Working			
		Size of Farms	Market Gardens	Vineyards	Labour
Subsistence polyculture/ Southern agriculture	1892	0.10	0.001	0.001	0.001
	1929	0.025	0.001	0.001	0.001
Intensive polyculture/ Urban agriculture	1892	0.001	0.001	NS	0.001
	1929	0.001	0.001	NS	0.001
Cereals/ Cereals with vines	1892	0.001	NS	0.001	0.001
	1929	0.025	0.01	0.001	0.025

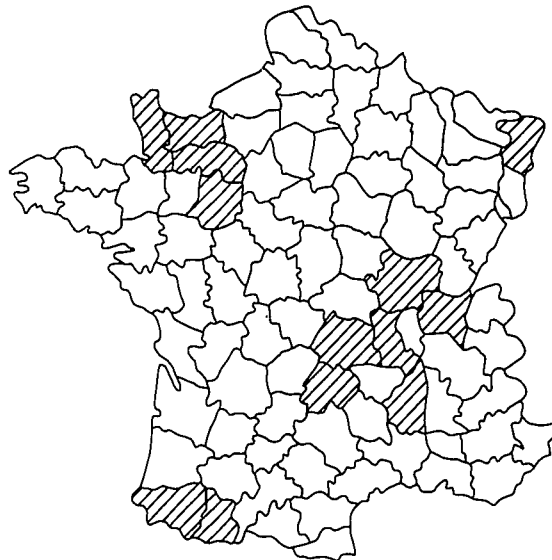
NS = Not significant

1929

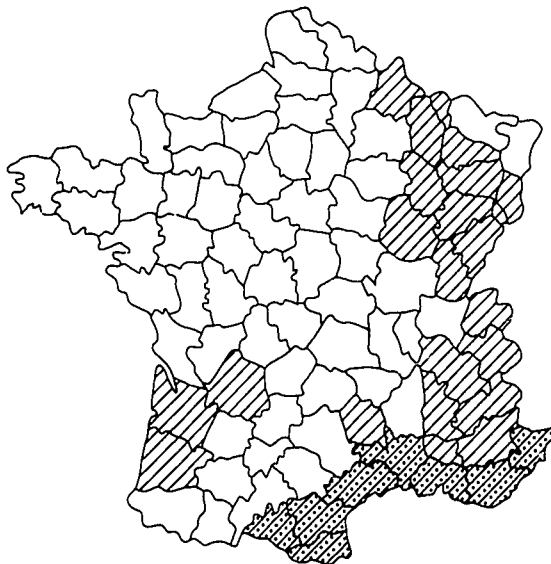
Cereals/cereals with vines



Livestock



Subsistence polyculture/southern agriculture



Intensive polyculture/urban agriculture

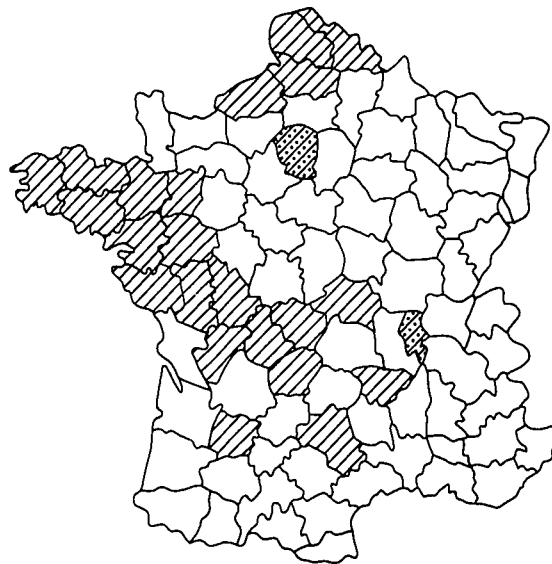


FIGURE 4
Agricultural regions 1929

The *départements* in each category altered slightly (Fig 4), which was to be expected given the regional variations in agricultural stagnation and intermittent improvement over the intervening period. The area of specialist cereal agriculture diminished in size, reflecting a national reduction in cereal cultivation since 1892. Particularly noticeable in this respect was the reduction in the relative importance of cereals in the Ardennes-Champagne-Lorraine area where five *départements* reverted to subsistence polyculture; it is suggested that the diminishing importance of cereals in this area was exacerbated both by economic depression and by the devastation of the Great War. Similarly, the cereals with vines category diminished with the exclusion of Vaucluse and Charente. The livestock category remained almost constant, but by 1929 there was a growing emphasis on livestock breeding in Normandy, which showed exceptional development; the major improvement was in the rearing of dairy cattle. While the specialist arable and pastoral areas contracted, intensive polyculture extended over a greater area of the Massif Central, and subsistence polyculture encompassed one-third of the country. This change is particularly indicative of the national depression in agriculture. Within the subsistence polyculture category, the zone of southern agriculture extended to include the Vaucluse and the eastern Pyrenees, both of which contained extensively replanted vineyards and market gardens.

V

In view of the varying labour requirements associated with the different agricultural regions, it was hypothesized that each area would be differentially susceptible to migration. It is suggested that the labour requirements of each area would have been ranked as in Table 2. The basis for this suggested ranking is the greater labour required by cereal cultivation, particularly at

TABLE 2
Hypothesized Ranking of Agricultural Regions According to Their Labour Requirements

Most labour intensive	
	Urban agriculture
	Southern agriculture
	Cereals with vines
	Cereals
	Intensive polyculture
	Subsistence polyculture
	Livestock
Least labour intensive	

harvest-time, compared to livestock rearing. The polyculture areas would have been intermediate between the cereal and the livestock areas in their labour requirements. The three sub-divisions would have been more intensive than their parent groupings in their use of labour.

The agricultural regions were tested for significant differences in their rates of rural out-migration, using two-tailed Mann-Whitney U-tests. The mean rates for each region in 1892 are shown in Table 3 and the significance levels of the results of the Mann-Whitney U-tests in Table 4. Out-migration from rural *communes* only was used as the dependent variable, because agricultural specializations and agricultural labour requirements were being used to account for migration rates. The net migration rates for rural and urban areas combined for each region are also shown in Table 3 for purposes of comparison; these total rates were greatly influenced by in-migration to urban areas, a phenomenon which had become increasingly prevalent by 1929. The use of migration data for rural *communes*, that is, *communes* with less than 2000 people in the *chef-lieu*, is obviously most appropriate for this analysis, except in the use and interpretation of migration rates for the urban agriculture category. This difficulty arose because the urban agriculture category contains only two *départements*, one of which, Seine, contained no rural

communes, so no data were available to assess rural out-migration. However, population movements around the major cities of Paris and Lyon were at best tenuously linked to agriculture and were much more greatly influenced by industrial, commercial, urban and suburban development.

A comparison of total migration rates with those from rural *communes* reveals a very wide discrepancy, which was particularly marked in the urban agriculture category. The only other grouping to show a positive total migration rate (as well as some

increase in rural population) was the southern agriculture category. This migration was an in-movement to the growing urban centres and tertiary employment opportunities of the Mediterranean coast, which at this time provided a migration focus second only to Paris.³⁷ The migration rates for the areas of southern agriculture were significantly different from almost every other category (Table 4), but as

³⁷ H P M Winchester, *Changing Patterns of French Internal Migration, 1891-1968*, University of Oxford School of Geography Research Papers, 17, 1977.

TABLE 3
Rural Out-migration Rates: Agricultural Regions 1892

	Agricultural Regions						
	Cereals	Cereals and Vines	Livestock	Urban Agriculture	Intensive Polyculture	Subsistence Polyculture	Southern Agriculture
Number of <i>départements</i>	19	8	12	2	21	18	6
Mean rural out-migration rate per 1000	-13.68	-26.36	-30.82	-79.6	-26.67	-35.94	+15.93
Coefficient of variation	150.29	70.59	60.64		45.33	68.36	314.69
Total net migration rate per 1000 (urban and rural <i>communes</i>)	-1.74	-13.41	-21.91	+52.5	-12.02	-20.87	+35.10

TABLE 4
Significance of Differences in Rural Migration Rates from Agricultural Regions 1892

	Cereals	Cereals with Vines	Livestock	Intensive Polyculture	Subsistence Polyculture	Southern Agriculture
Cereals		NS	0.02	0.02	0.05	NS
Cereals with vines			NS	NS	NS	0.05
Livestock				0.10	NS	0.05
Intensive polyculture					0.05	0.05
Subsistence polyculture						0.02
Southern agriculture						

NS = Not significant

with the areas of urban agriculture, explanation for these rates cannot be derived from agricultural structures alone.

In 1892, at the other end of the migration spectrum, were the areas of livestock farming and subsistence polyculture, both of which exhibited massive rates of rural population loss and high overall losses. The rural out-migration rates from these two areas were not significantly different from each other. In both cases this massive haemorrhage of labour was indicative of the difficulties of earning a living on predominantly poor upland terrain, with inadequate resources, machinery, or even land. The areas of intensive polyculture were, however, more successful at stemming the outflow of migrants and although the rate of out-movement was still high, it was significantly different at the 0.10 level from the areas of livestock farming and subsistence polyculture. This significance level is not high, but may be used as an indicator to suggest that the more intensive form of polyculture was more successful in retaining its labour force than subsistence-level polyculture.

The cereals with vines category exhibited a high rate of rural migration loss, not significantly different from the livestock or polyculture areas, despite the high labour requirements of viticulture. In fact at this time these areas were unimproved, with a poverty of farming environment rather similar to the areas of polyculture, conducive to out-migration.³⁸ In 1892, the major cereal producing category of northern France was the most successful region in retaining its rural labour force, and in this respect was significantly different from every other group except for southern agriculture. The cereal growing area was the most advanced area of intensive agriculture in the country at this time, which required and absorbed a large labour force. The cereal region, as with southern agriculture, did, however, contain

areas of great attraction for migrants and it is not altogether clear to what extent these areas may have influenced the apparent stability of the rural labour force. Furthermore, the differences in wage-rates examined by Goreux and Hohenberg will also have served to stabilize and attract labour.³⁹

VI

By 1929 the pattern of agricultural regions had altered; war damage and economic depression had continued to reduce the cereal growing area and as a consequence, the area of subsistence polyculture had become extended. The rural migration rates for each area in 1929 are shown in Table 5, and the significance of the migration differences in Table 6. As in 1892, the urban areas showed high total in-migration and high rural in-migration, attributable at least in part to suburban expansion. The areas of southern agriculture exhibited remarkable variability; rural migration rates ranged from -50 per 1000 to +50 per 1000 from *département* to *département*. These two categories of urban agriculture and southern agriculture are not considered further, because of the major significance of non-agricultural factors influencing migration rates.

The other agricultural areas continued to show substantial rural out-migration despite marked urban growth in most areas. The rate of rural migration from the cereals with vines area altered dramatically from 1892. In 1892, the area had shown substantial rural out-migration, but by 1929 this area exhibited a very low rate of rural out-migration. This rate became significantly different from areas of polyculture, whereas in 1892 the differences had not been significant. This decrease in the rate of net out-migration may be attributed to substantial in-movements of foreign workers,

³⁸ Chombart de Lauwe, *op cit.*

³⁹ Goreux, *op cit.*; Hohenberg, *op cit.*

TABLE 5
Rural Out-migration Rates: Agricultural Regions 1929

	Agricultural regions						
	Cereals	Cereals and Vines	Livestock	Urban Agriculture	Intensive Polyculture	Subsistence Polyculture	Southern Agriculture
Number of départements	14	6	13	2	22	24	8
Mean rural out-migration rate per 1000	-20.39	-9.50	-21.86	+64.40	-35.19	-30.94	-6.93
Coefficient of variation	123.49	235.89	94.24		66.55	67.81	489.03
Total net migration rate per 1000 (urban and rural communes)	+4.52	+13.08	-4.69	+64.40	-18.17	+7.61	+67.53

TABLE 6
Significance of Differences in Rural Migration Rates from Agricultural Regions 1929

	Cereals	Cereals with Vines	Livestock	Intensive Polyculture	Subsistence Polyculture	Southern Agriculture
Cereals		NS	NS	0.02	NS	NS
Cereals with vines			NS	0.02	0.02	NS
Livestock				NS	NS	NS
Intensive polyculture					NS	0.10
Subsistence polyculture						0.10
Southern agriculture						

NS = Not significant

which also contributed to the relative agricultural advancement of this area in the 1920s.⁴⁰ On the other hand, the northern cereal areas became more similar to other areas in their migration characteristics, with much more substantial rural losses than formerly, heavily influenced by war damage and restructuring.

In both periods, the areas of heavy migration loss were the areas of subsistence and intensive polyculture, which showed significantly greater out-movement than

most other areas. However, the greatest out-movement in 1929 occurred from areas of intensive polyculture, whereas in 1892 rates of loss at this very high level (about 30 per 1000) were characteristic of the livestock and subsistence polyculture categories. This changing pattern of migration is further examined in the next section.

On a general level it is quite clear from the foregoing analysis that migration rates varied significantly between agricultural type regions; the areas of *petite culture* were less capable of supporting their rural populations, whereas areas of more special-

⁴⁰ A Demangeon and G Marco, *Documents pour Servir à l'Etude des Etrangers dans l'Agriculture Française*, Paris, 1939.

ized and intensive agriculture were relatively more successful in doing so. The high level of rural to urban migration from the polyculture and livestock categories is symptomatic of both the difficulties of agriculture in marginal areas at this time, and of the greater attraction of wider employment opportunities and a higher living standard in the growing cities.

VII

The pattern of observed out-migration from agricultural regions may be compared with the hypothesized ranking set out in Table 2. Table 7 shows the actual rankings for both 1892 and 1929. If the urban category is ignored, it is clear that there is a greater loss from the polyculture and livestock areas than from the cereals and other more intensive categories. However, the rankings within those broad divisions were not always exactly as expected. In 1892, the cereals with vines category lost more population than expected because of the unimproved nature of agriculture at that time. Otherwise, the relatively intensive agricultural regions of cereal growing, cereals with vines and southern agriculture were, as expected, comparatively successful in maintaining

rural population levels. However, the polyculture and livestock areas, although all exhibiting great losses, were not ranked as expected. In particular, the areas of intensive polyculture became markedly less successful in retaining population from 1892 to 1929, whilst the livestock rearing areas lost progressively fewer people than had been anticipated from the labour requirements of this type of agriculture.

Some explanation for this mismatch of agricultural labour requirements and rural out-migration may be derived from examination of the variation in the availability of labour. The rate of natural population growth is used as a surrogate for the rate of increase in the local labour force. Over the period 1892-1929, correlation between migration and natural growth remained virtually constant at -0.23 (significant at the 0.01 level); this negative relationship indicated that areas of natural growth were associated with out-migration in a population pressure phenomenon. Fig 5 shows areas of out-migration in relation to natural growth or decline for both periods.

In the 1890s, there were very few areas of in-migration and only seven *départements* exhibited in-migration with natural growth. In all other areas of in-migration, crude death

TABLE 7
Comparison of Actual with Hypothesized Rankings of Rural Out-migration Rates from Agricultural Areas, 1892 and 1929

	1892	Hypothesized	1929
Most labour intensive: low out-migration	—	Urban	—
	Southern	Southern	Southern
	Cereals	Cereals with vines	Cereals with vines
	Cereals with vines	Cereals	Cereals
	Intensive polyculture	Intensive polyculture	Livestock
	Livestock	Subsistence polyculture	Subsistence polyculture
Least labour intensive: high out-migration	Subsistence polyculture	Livestock	Intensive polyculture

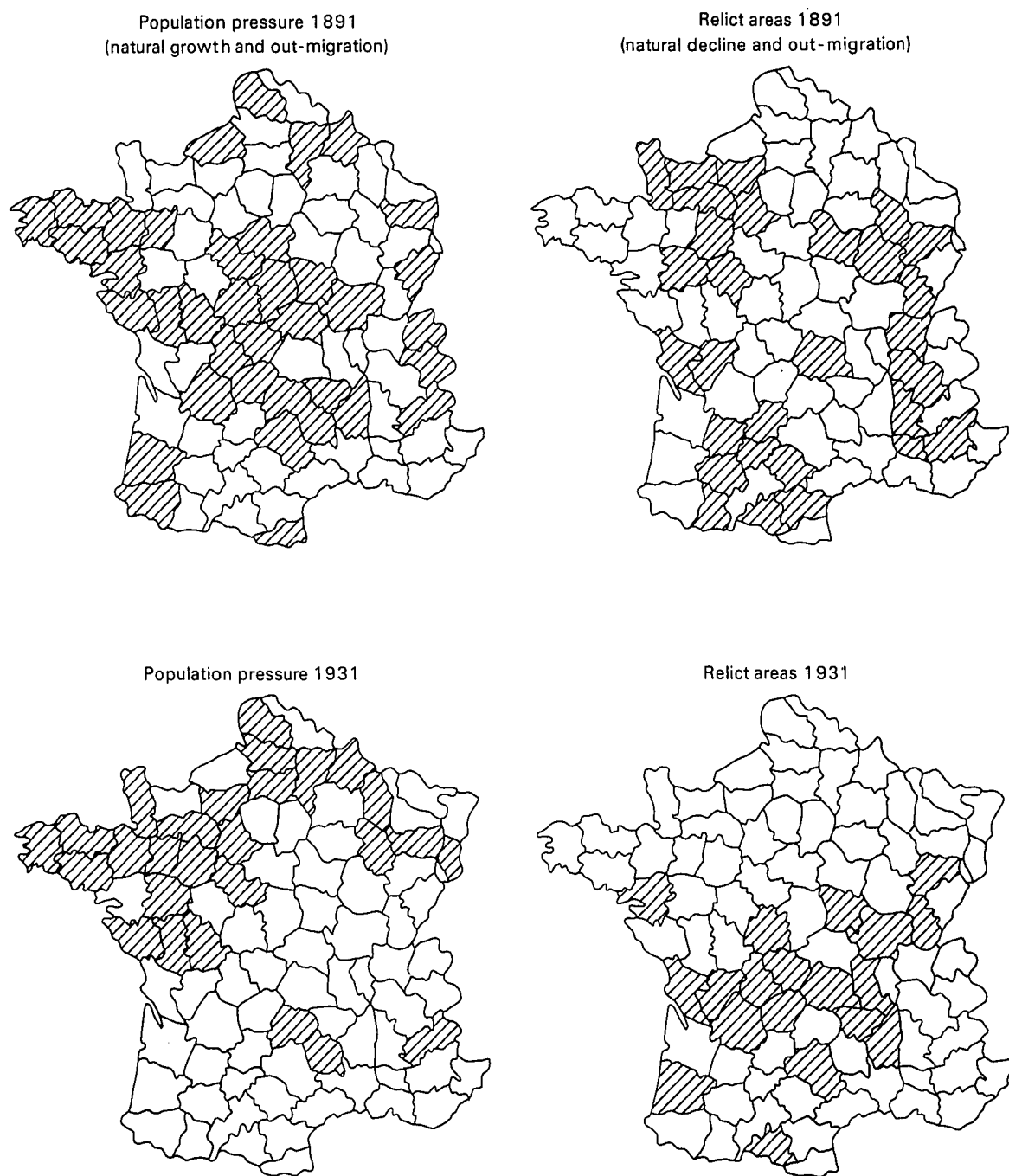


FIGURE 5
Out-migration and natural population change,
1891 and 1931

rates exceeded crude birth rates; these conditions of natural decline may be explained by poor environmental conditions in the urban reception areas, by the migration of single persons rather than families, and by the seasonal or temporary nature of much migration at this time.

In 1891, the areas of natural growth and out-migration (areas of population pressure) consisted of Brittany, the Massif Central and much of the highland perimeter; these were therefore predominantly areas of livestock breeding and polyculture. On the other hand, areas of natural decline and out-migration (relict areas) consisted of parts of Normandy, the Midi and the Rhône-Saône corridor. In these *départements* labour was being reduced in two ways; by rapid out-movement and by a fall in fertility. In the areas of population pressure, on the other hand, the early decline in fertility so peculiar to France had not yet occurred. In Brittany and the Limousin rates of growth were at 'under-developed' levels with annual increases of 2.5 per cent or more. Out-migration was high but not excessively so, and in no case did it adequately export this growing population. In the absence of heavy out-migration, in areas of limited natural resources, the only other major possibility for the support of such a rapidly growing labour force would have been in the provision of further employment at home. Given the steady decline of employment in local crafts and industries, further employment in a predominantly agricultural society would have necessitated the improvement or extension of agriculture. In the Nord, similarly high levels of natural growth occurred in a rather different context; high fertility levels were particularly associated with groups of miners and other workers who were often resident in 'rural' *communes*. In this region, some expansion of employment opportunities did occur in the home areas, in mining, textiles and metallurgy, as well as opportunities for market gardening and commercial agriculture.

By 1931, the spatial relationships between migration and natural growth had been altered by the violent fluctuations in the rate of natural growth, which had fallen dramatically in the years of the depression.⁴¹ The areas of in-migration had become more extensive, with steady growth occurring in parts of Burgundy, the Rhône-Alpes, Alsace and the Midi, as well as continued rapid growth in existing urban concentrations. The population pressure phenomenon had become confined to Brittany and some of the war-disrupted areas of the Ardennes and Picardy; on the other hand, the Massif Central had become a relict area by this time, experiencing natural decline and out-migration.

Areas of population pressure needing to create employment were thought likely to show evidence of agricultural intensification. The improvements and innovations in agriculture which were recorded in the agricultural censuses of 1892 and 1929 may be classified according to whether they created employment, or whether they replaced labour by other factors of production. Creation of employment was most obvious in the extension of the cultivated area, while substitution of labour occurred with the adoption of most machinery. Intensive improvements, such as application of fertilizers, may also be viewed as substitutes for labour although they do not fall directly into this category. However, they increased productivity for the same labour input, thereby indirectly releasing more labour to work in sectors other than agriculture. Similarly, reafforestation was classified as substituting labour, because the land use had been altered for what was usually a less productive and less labour-consuming activity.

The extensive (labour-using) and the intensive (labour-losing) improvements in farm structure, and the use of machinery, are therefore each considered separately. It is

⁴¹ C Dyer, *Population and Society in Twentieth Century France*, 1978.

hypothesized that areas of natural growth would undertake more extensive improvements in agriculture than areas of natural decline, in order to absorb the surplus labour force. This hypothesis is tested by the use of a simple one-way measure of association, percentage difference. The example of percentage difference in land clearance in 1892 between the areas of natural growth and natural decline is shown in Table 8.

TABLE 8
Percentage Difference: Land Clearance 1892

<i>Départements with:</i>	<i>Land Clearance</i>		<i>No Land Clearance</i>	
	Number	%	Number	%
Natural growth	19	49	20	51
Natural decline	4	8	44	92
Difference		<u>41</u>		<u>41</u>

The percentage differences in adoption of improvements between areas of natural growth and those of natural decline are shown for 1892 and 1929 in Table 9. In 1892, it was clear that the extensive improvements which provided land by clearance of unproductive and marginal areas, and thereby utilized labour, were much more widely employed in areas of natural growth. This suggested that the pressure of population on resources had found an outlet other than migration, which was the creation of intervening opportunities in agriculture in the home area. The pattern was reversed for much of the agricultural machinery which replaced labour, the adoption of which predominated in areas of natural decline. This was particularly noticeable in the case of mowing machines, which significantly reduced the number of itinerant harvest labourers, *moissonneurs*, required for both the hay and grain harvest. Other implements similarly reducing harvest labour requirements were binders, and rakes and tedders. It is noticeable that the great seasonal move-

ments of labour began to decline about this time in favour of more permanent out-migration.

TABLE 9
Percentage Difference: Agricultural Improvements and Natural Growth or Decline

<i>Extensive Improvements (labour-utilizing)</i>		
	1892	1929
Land clearance	41	7
Woodland clearance	32	3
Marsh clearance	32	21
<i>Intensive Improvements (labour-losing)</i>		
	1892	1929
Reafforestation	10	15*
Drainage	5	6
Irrigation of arable	11	7*
Irrigation of pasture	16	5
<i>Agricultural Machinery</i>		
Mechanical mowers	21*	2*
Binders	14*	3
Rakes and tedders	11*	9
Fertilizer spreaders	5*	21
Ploughs	4*	12
Mechanical drills	8	24
Tractors	No data	35*
<i>Fertilizers</i>		
Nitrates	No data	10
Phosphates	No data	33
Potash	No data	14

* Associated with natural decline

Other types of machinery were more generally widespread, although ploughs and fertilizer spreaders were more often found in areas of decline, while mechanical drills were more often associated with natural growth.

By 1929, the pattern of improvement adoption was already less clear. The labour market and the agricultural sector had been disrupted by economic depression and foreign competition, as indicated earlier. The rate of land improvement had declined considerably with the exceptions of space-covering reafforestation, and the continuing progress of irrigation, particularly in the areas of southern agriculture. On the whole,

these improvements showed no clear pattern of association with natural growth or decline, although reafforestation and irrigation were both more predominant in areas of population loss. Land clearance had passed its peak, as the rural population continued to decline, and as competition rendered agriculture less profitable. Some clearance of marshland was still occurring in areas of natural growth, notably in Brittany, a remnant of the first agricultural revolution which had ended a century earlier in the Paris basin.

Of the agricultural improvements which replaced labour, tractors, the major innovation of the period, were most significantly associated with areas of natural decline and potential labour shortage. These, unlike the specialized implements or the use of chemical fertilizers, were to be found in the initial stages of adoption where their impact on labour needs was greatest. As with the innovations of the 1890s, however, such as mechanical mowers, the tractors quickly became more widespread, especially into the areas of specialist arable agriculture.

VIII

In 1892 the relationships between population growth, agricultural specialization and the

outlets for labour were complex but relatively clear. Areas of high natural growth had two main outlets for surplus labour; one was out-migration, the other was land clearance, and thereby the provision of more labour opportunities in agriculture. Thus areas such as Brittany and parts of the Limousin and Picardy in 1892 were able to absorb some labour by extensification of agriculture.

However, by 1929, more out-migration than expected according to labour requirements was originating from those agricultural areas engaged in intensive polyculture. By this time, agricultural development had been pushed to the limits of its physical resources, and land clearance and improvement had been extended to marginal areas. As opportunities in agriculture dried up, so out-migration increased. It appears therefore that agricultural improvement in the period 1892-1929 may be viewed as an intervening factor between natural growth and out-migration. On the other hand, at this time the areas of natural decline were unable, because of limitations of either physical or labour resources, to extend the agricultural area and so, in the early stages especially, exhibited substantial rural out-migration. The declining labour force then acted as an added stimulus to the adoption of labour-saving machinery.