

1990-70

Faculteit der Economische Wetenschappen en Econometrie

ET

Serie Research Memoranda

05348

Spatial Developments in The United States of Europe:
Glorious Victories or Great Defeats

P. Nijkamp

Research Memorandum 1990-70
December 1990

vrije Universiteit

amsterdam





1. Towards the United States of Europe

The old world has, in recent years, shown surprising signs of economic and political revitalisation. After several decades of desperate struggling for economic and political unification among the countries of the European Community, suddenly and without too thorough reflection the tide has changed. The magical year 1992 has been accepted throughout Europe as a decisive historical landmark in the evolution of Europe toward international competitiveness, economic and technological leadership at a global level, and internal cohesiveness and cooperation. The choice of the year 1992, made a few years back and meant to be a transition to a new future for Europe was already in itself a remarkable example of clever psychological-political insight: a period of 4 to 5 years is long enough to allow for economic and political adjustments and short enough to call for concrete actions. It should be added as well, however, that the decision for one European market as of the beginning of the nineties has not been so much the cause of the recent avalanche of transnational orientation in Europe, but rather the **consequence** of many deeply rooted economic and technological developments in the European countries after the recession period in the beginning of the eighties. It was increasingly recognized that a unification of the European economies is a **necessary** condition for economic survival of Europe in the medium and long term, and this awareness has only had political sanctification by giving it a special blessing in the form of the magical year 1992 as the starting point of a new era.

In the meantime, the impact of 1992 is already immense, perhaps even larger in the years before 1992 than thereafter. It has led to a complete reorientation of economic policies - both private and public - in Europe, followed by new initiatives in technology, finance and science policy. And it is conceivable that several non-member states (such as Austria or Turkey) wish to apply for membership, whilst others (such as Sweden, Finland, Norway and Hungary) look for special ways of avoiding exclusion from the economic benefits of the largest trade block in the world.

Clearly, the economic benefits of a united Europe are not always evident. There is a great potential, but at the same time a high risk (e.g., the costs of a multi-lingual bureaucracy in Brussels). The studies which have been undertaken by the European Commission all point at high foreseeable gains of trade and competition, but underestimate the costs of multi-cultural international economic cooperation.

In the document of the Commission of the European Communities, especially in the so-called White Paper (1985), a strong plea has been made for the completion of the single European market of all EC member countries based on the viewpoint that the gains of an open and integrated market far outweigh the costs of semi-protected national markets. The failure of the original EEC treaty to realize a really common European market meant in practice a support for national protectionism, despite the abolition of customs duties. Especially the legalized common practice of non-tariff barriers has led to high opportunity costs. These 'costs of non-Europe' (see also the Cecchini Report) are aimed to be avoided by creating a free internal EC market without frontier controls for goods, services and production factors. However, it should at the same time be emphasized that a really free European market will only reap the fruits of an international integration, if also a harmonisation and coordination of all social, economic, technology, environment, energy, transport and regional policies is established. In this context, Karin Peschel (1989) rightly criticized a weak element in the Commission's White Paper, viz. the principle of mutual recognition of national rules and situations. This principle may favour situations where the lowest national standards regarding e.g. health, safety and environmental protection might be accepted. It does not motivate a more strict policy of those countries which are above the standards. Unfortunately, low ambitions and less strict rules are probably the best - and perhaps only - ways of shaping a single European market. But nevertheless, the removal of many unnecessary and irrational obstacles - seen from a European angle - may herald a new era for the countries and regions in Europe.

It is well-known from the literature that integration effects may already be considerable in case of **static** reallocation effects caused by relative price changes along a production possibility frontier. These effects, however, may even be much higher in the case of **dynamic** integration effects caused by shifts in the production frontier itself, e.g. as a consequence of technological progress, institutional reforms or deregulation, improved international connections, or higher regional accessibility (see also Commission of the European Communities, 1988). The assessment of the potential gains of completing the internal market - or, alternatively, the costs of non-Europe - is of course far from easy, but amount on an annual basis to at least 150 billion ECU's, with the highest benefits achieved in the micro-electronics industry, car industry, chemical industry, mechanical engineering and food industry.

The regional distribution of such benefits, however, are largely unknown.

2. Regional Implications

The regional implications of the completion of the single European market have hardly been studied in a systematic manner. The theoretical framework is diffuse and does certainly not lead to unambiguous results. Unfortunately, an important analytical framework, the so-called Williamson hypothesis (see Williamson 1975), has to a large extent been neglected in the scientific literature. The Williamson hypothesis is a structural equilibrium approach and distinguishes two stages in the process of interregional inequality as a consequence of an increase in national development:

- a phase of increasing interregional (income) inequality during the initial course of national development;
- a phase of converging interregional income development in later stages of national development.

Thus **divergence followed by convergence** is the interregional development trajectory implied by the Williamson hypothesis, in which the backward areas which are initially lagging behind are able to catch up at the end. This equilibrium model, which - in contrast to the comparative cost theory - presupposes free movements of capital, labour and information, is of course only plausible in case of a free market system. It seems that to a large extent the views expressed in the Commission's White Paper are implicitly based on the Williamson hypothesis.

Clearly, there is also a **disequilibrium** view on regional development. This view supports essentially the so-called **typhoon principle** which asserts that when an external force (e.g., a typhoon, a completion of a European market) hits a multiregional economy, at the end the richer regions will always be better off and the poorer regions worse off. This may be caused by rigid and established center-periphery relationships, protectionist measures for the strongest market parties, or fixed dualistic social and political structures. Especially under these conditions there is a clear case for public intervention and regional policy.

The question whether there is - after 1992 - scope for regional policy in Europe, will be critically dependent on the degree of rigidity of regional economic policy structures which - if these are based on

regional or national self-interest - may hamper a flexible adjustment of the European economy as a whole. Only if regional policy aims at improving the competitiveness of Europe as a whole and hence of all regions in Europe, one may expect positive benefits from a **European-oriented regional policy**.

Unfortunately, **empirical evidence** regarding the regional effects of integration is fairly weak, despite attempts made among others by Clark et al (1969) based on a regional economic potential concept, and of Keeble et al (1982) based on a centrality concept. There is a clear need for a well-specified multiregion - multination model, which incorporates both static and dynamic integration effects. Some first attempts made inter alia by the Institute for Regional Research in Kiel (see among others Bröcker and Peschel, 1988) have to be followed up and extended in other countries. Such a coherent model should not be purely based on neo-classical mobility and flexibility assumptions related to comparative advantage and regional specialisation principles, but rather on economies of scale and scope, on agglomeration advantages and barrier costs, and on transition costs for factor and commodity mobility.

A few observations are in order in the context of assessing the regional implications of a single international market.

In the first place, it should be recognized that an assessment of regional inequality consequences of a transnational economic unification ought to take account of the **regional scale of analysis**. It is evident that the more detailed the spatial aggregation level, the higher the spatial (or interregional) inequality. This can be illustrated by means of results from the Biehl (1986) report, in which for Europe of the 10 the Italian region of Calabria was regarded as the poorest European region. However, in this study Greece was regarded as a single region because of lack of appropriate data. In later analyses, however, it turned out that - after a regional subdivision of Greece - the Greek islands scored even worse than Calabria. For cross-national comparisons a uniformity of regional demarcations is of critical importance in order to reach reliable and policy-relevant results.

A second observation concerns the **multi-layer structure** of regional implications of transnational changes in economic institutions. A free market among countries has allocative efficiency consequences for these countries individually, but at the same time the **sectoral** changes will be connected with **regional** changes. Thus to some extent - via shifts in product specialisation as a consequence of factor mobility - changes at a national - sectoral level manifest themselves in changes at regional -

sectoral levels. This means that with some variation patterns at a higher spatial level are mirrored at a lower spatial level. Such a mapping is essentially an application of the **theory of fractals** in regional science. It would certainly be an extremely interesting research direction to develop a model that would generate a fractal representation of regional evolution in the context of international economic dynamics. Equilibrium tendencies might then be analyzed by specifying a model based on the principles of **chaos theory** (see also Nijkamp and Reggiani, 1989). An extremely simplified version of such a chaos type of model with fractal properties is sketched in the Annex. The results of this exercise are rather straightforward: low growth leads to stable international-national-regional development, whereas very fast growth tends to destabilize an integrated international-national-regional economic system.

The broader regional impacts of the completion of the European market are not only determined by the competitive performance of regions inside the EG, but also - and to a large extent - by the degree of **openness** of the EC for non-EC producers and investors. A closed shop for non-EC members runs the risk of reducing the gains of the internal market for all regions. Thus the benefits of the internal market will be higher, as trade and investments with inter alia the EFTA-countries, the Middle-East, the USA, Japan and South-East Asia will be more liberal.

The actual impacts of foreign trade and investments on regional development depend thus essentially on the above mentioned two-layer structure:

- the attractiveness of the Community for foreign trade partners;
- the competitive position of a region in a European context.

The competitive position of regions is largely determined by comparative cost advantages, technological progress, agglomeration economies, and creation of a specialized market niche. Since conventional production factors (capital, labour, energy, information and technology) tend to become increasingly mobile within the EC, the competition between regions will increase, whilst the evolution of a regional system will become less rigid than in the past. Unanticipated dynamics may be regarded as a likely feature of the European space-economy. Consequently, the identification of strong and weak points in the regional **location profile** becomes of critical importance in a regional impact analysis. The elements of such a locational profile may

be two-fold, viz. region-specific (e.g., accessibility) or nation-specific (e.g., legislation). In order to improve such a locational profile, **technology policy** and **infrastructure policy** are decisive factors. Both aspects will be touched upon in this essay.

3. Technology Policy

Regions in an interwoven open economy will benefit most from both static and dynamic integration effects, if their production structure is in harmony with their locational profile. Technology policy at local and regional levels is one of the most important vehicles for maximizing the comparative advantages of a dynamic spatial system (cf. Cuadrado Roura, 1988, and Malecki and Nijkamp, 1988). The gains from trade are thus emerging from a regional specialisation which exploits the regional development potential by means of the vehicle of technological progress.

From this perspective, it would be plausible to find that regions would orient their technology policy toward those niches which give them the highest benefits from **regional specialisation**. In other words, conventional wisdom would suggest a specialisation in regional technology policy. In this context, it is surprising to find that the technology policies in most countries do not substantially differ. For instance, Roobeek (1989) found for various OECD-countries that the main technology trajectories in these countries were all focussed on a limited number of new technology fields, such as information technology, bio-technology, new materials technology. Apparently, due to a similarity in technological regimes, countries have become competitors rather than seeking for complementary strategies.

This surprising observation implies that countries and regions do not specialize, but mainly compete in the same market. This struggle for similar market niches is certainly not necessarily beneficial for the regions in the European Community, as the competitive conditions for many of these regions are not equal. This observation points at a high probability of many losers in a relatively small number of market niches, rather than at a high probability of many winners in a broader set of niches.

In this perspective, it is extremely important that regional technology policies of the EC do not emphasize exclusively technological progress shaped by giant companies (which are only focussed on a limited number of market areas), but also on **small and medium sized industries** (see Giaoutzi et al., 1988), which are more flexible in their regional

specialisation (see also Cappellin, 1989). Thus a **local or regional orientation** of EC technology policy is of critical importance for maximizing the dynamic integration effects (see also Cappellin and Nijkamp, 1989).

It will be clear that the **spatial implications of various new technologies** may be tremendous. One is often inclined to think of the spatial consequences of telecommunications (see e.g., Nijkamp and Salomon, 1989), but the integration of other new technologies in conventional sectors may even have many more far reaching consequences. For instance, modern bio-technology with its recombinant RNA technique and hybridoma technique may remove natural barriers in plant and animal production. Such applications may have unprecedented implications for the agriculture, fermentation industry, animal husbandry, food industry, and health care. From a spatial perspective, the foreseeable rise in productivity of crops, animals and human labour related to modern bio-technology may have immense effects on land use in the EC countries (see also Heerema and Hoffman, 1989).

It is also noteworthy that the regional acceptance of new technology is not only dependent on the 'performance' in the short run, but also on the **social support** in the long term (see Laulan, 1986). This implies that technology policy is not only a **supply-oriented** policy, but also a **demand-oriented** strategy (see also De Smidt and Conijn, 1989). The introduction of Minitel in France provides a very interesting illustration of the latter observation.

In conclusion, technology may be a vehicle par excellence for reaping the fruits of dynamic integration in the single European market, but at the same time it may lead to a distortion of regional equilibrium, if it is not **tailor-made with respect to the regional selection environment**.

4. **Transport Policy**

Europe is in motion. The action radius of commuting is structurally rising, the volume of commodities transported nationally and internationally is increasing, and the airlines activities for both passengers and commodities are booming. In a recent publication this mobility drift in Europe has been described as the 'Euro-mobile' phenomenon (see Nijkamp et al., 1989).

Transport policy favouring a free movement of persons and commodities in the EC is a sine qua non for a single market. The removal of

barriers is of great importance for obtaining the highest dynamic integration benefits.

It is surprising to observe that in most European countries transport has exhibited clear signs of **devolution** (see Van Gent and Nijkamp, 1989). This devolution appears to be a uniform phenomenon, although in various countries and cities it manifests itself in different forms, e.g., deregulation, decentralisation and privatisation. However, the first and most noticeable observation in the above mentioned study is that there is a striking parallel movement of transport policies.

The previous results lead to various interesting conclusions the most pronounced one being the surprising uniformity in the evolution of transport policies in most European countries in the past three decades: a period of expansion in the 1960s, a period of contraction in the 1970s and an era of selective expansion in the 1980s, in which the direction of selection is strongly governed by either market forces or by decentralisation principles. Countries with a more liberal policy model and/or with severe deficits of the public budget are apparently the first ones to advocate privatisation - in combination with deregulation - of transport policy, not only in the airlines sector and the freight sector, but also in the public transport sector. Clearly, among all these countries significant differences do still exist, as the intensity of economic stagnation and of monetarist policies may drastically vary. Similarly, in some countries local autonomy rather than privatisation can be observed as a political ideology. Altogether, however, the hypothesis of a financially-driven deregulation ideology turns out to be reasonably valid in many European countries.

A second observation to be made here is that European transport policy should not only be focussed on an improvement of the intra-EC infrastructure, but that it should pay attention in particular to **external links**. As mentioned before, an open EC has the highest benefit for both the Community itself and the world economy as a whole. Thus the improvement of cross-frontier routes are extremely important, such as the Trans-European Motorway, the Scandinavian links or the connections with Africa. In the future also major links to East-European countries would have to be envisaged. There is also a good case here for cooperation between non-member countries which provide (transit) links between EC-members, such as Switzerland, Austria and Yugoslavia. It goes without saying that a balanced transport policy is of critical relevance for regional equilibrium in the Community. The current tendency toward major

fast links is not by definition beneficial to all regions, and certainly not for those regions which are not served by fast transport lines or only intersected by these lines. Extensive evaluation research would be necessary here to provide policy-makers with adequate guidelines.

The major stimulus for new and advanced infrastructure policy is given by **information technology** (information, telecommunications and electronics). Physical distribution is increasingly relying on informatics-related activities. That holds true for containerisation, fast trains and airlines. Accessible and internationally coordinated information systems are becoming a major vehicle for a further improvement of transportation in the Community. The International Transport Information System (INTIS) in the port of Rotterdam is a good example of this development. A necessary condition for further penetration and success of such information systems is **standardisation**, and this policy issue is one of the most crucial corner stones of the European transport policy. JIT principles and multimodal logistic chains will never become fully operational without sufficient standardisation.

Finally, the development of new **mega-infrastructure**s, such as the Channel Tunnel, the ICE, the TGV, mega-airports etc. have to be mentioned. From a transportation viewpoint this all looks promising; from an ecological viewpoint serious doubts may be raised. In a recent study we concluded that future transport needs are incompatible with ecological paradigms unless the possibilities of subterranean fast transport, e.g., based on vacuum pipelines, would be taken much more seriously (see Nijkamp, 1989). Recent developments in Switzerland, the East corridor in the USA, Japan and the Netherlands may lead to interesting results. Seen from the current ecological perspective, it is not at all evident that modern large-scale infrastructures add to the social well-being and quality of life of the large agglomerations of the Community. **Regional sustainable development** will therefore be a major concern in the next decades (see also Archibugi and Nijkamp, 1989).

5. Epilogue

In the previous sections I have pointed out several potentials but also various threats of a single European market, seen from a regional perspective. It turns out that the search for a Schumpeterian type of 'creative destruction' followed by 'new combinations' in a European setting may lead to dramatic changes in economic and regional conditions. For the first decade(s) of a new single EC market the

probabilities of disequilibrating tendencies at a regional level are fairly high. Consequently, regional analyses will gain in relevance and importance in the next decades, whilst many research efforts have to be oriented towards regional technology and infrastructure analysis. In so doing, the focal points would have to be: analysis of spatial potentials and barriers in Europe, and investigation of market failures and intervention failures at local and regional levels from the viewpoint of multi-layer integration effects.

Annex A. A Multi-Layer Fractal Evolutionary Model

Suppose a dynamic multi-region multi-nation economy whose evolution of production can be described by means of a (neo-classical) quasi-production function (see Nijkamp 1989) including conventional production factors C (capital, labour, land, energy etc) and overhead production factors T (technology, transport infrastructure etc) as arguments:

$$Y_{rn} = \gamma_{rn} C_{rn}^{\alpha_{rn}} P_{rn}^{\beta_{rn}} \quad (A1)$$

with:

- Y_{rn} : share of production of region r in production of nation n;
- C_{rn} : share of conventional production factors in region r with respect to nation n as a whole;
- P_{rn} : share of overhead production factors P in region r with respect to nation n as a whole.

The parameters γ_{rn} , α_{rn} and β_{rn} are the usual coefficients in a Cobb-Douglas function.

It can easily be demonstrated (see Nijkamp 1989) that (A1) can be written in difference equation form as follows:

$$\Delta Y_{rn,t} = (\alpha_{rn} c_{rn,t} + \beta_{rn} p_{rn,t}) Y_{rn,t-1} \quad (A2)$$

with:

$$\Delta Y_{rn,t} = Y_{rn,t} - Y_{rn,t-1} \quad (A3)$$

$$c_{rn,t} = (C_{rn,t} - C_{rn,t-1})/C_{rn,t-1} \quad (A4)$$

$$p_{rn,t-1} = (P_{rn,t} - P_{rn,t-1})/P_{rn,t-1} \quad (A5)$$

After the external shock of a single competitive market, region r in country n may try to increase its share in nation n - and hence in the whole single market - by using C_{rn} more efficiently, inter alia by increasing the investments in P_{rn} . Then it will fully benefit from both static and dynamic integration effects.

However, given the available resources, there is a critical limit to the expansion capabilities of region r in country n. If we denote this critical limit by $Y_{rn}^{\max}$, then it is clear that region r will face a

decreasing production efficiency when it reaches $Y_{rn}^{\max}$ and may even face a negative production elasticity α_{rn} beyond the limit $Y_{rn}^{\max}$. In other words, beyond this capacity limit an auxiliary relationship reflecting a negative marginal product may be assumed:

$$\alpha_{rn,t} = \hat{\alpha}_{rn} (Y_{rn}^{\max} - \delta Y_{rn,t-1}) / Y_{rn}^{\max} \quad (A6)$$

Substitution of (A6) into (A2) leads to:

$$\begin{aligned} \Delta Y_{rn,t} = & \hat{\alpha}_{rn} c_{rn,t} (Y_{rn}^{\max} - \delta Y_{rn,t-1}) Y_{rn,t-1} / Y_{rn}^{\max} + \\ & + \beta_{rn} P_{rn,t} Y_{rn,t-1} \end{aligned} \quad (A7)$$

This model is a general type of May model, one of the standard models in chaos theory. It has unusual properties in that it may exhibit a remarkable spectrum of dynamical behaviour, such as stable equilibrium, stable cyclic oscillations, stable cycles, and chaotic regimes with a-periodic but bounded fluctuations. Its evolution is determined by initial values of $Y_{rn,t}$ and the growth rate of the regional system (which is co-determined by $\hat{\alpha}_{rn} c_{rn,t}$). In figures 1 and 2, results of two simulation experiments are presented. It turns out that in case of high growth rates the probability of chaotic behaviour increases.

Next, we may assume a similar (national) production function for the production share of country n in a single market. This leads of course to the same type of conclusions as sketched above.

Then, however, both country n and all its regions are competing on the same market. This implies that the evolution of the production possibility frontier of region r in country n is co-determined by the performance of the country as a whole: the higher its competitive success, the larger the amount of resources available for overhead capital which may improve the competitive positions of all regions, and so forth.

In other words, one may assume an auxiliary relationship for the growth of overhead capital in region r in country n as a function of the income generated by country n as a whole (i.e., Y_n). It is evident that also here we may face a situation of declining marginal production efficiency for the creation of new effective overhead capital in region r of country n , i.e.:

$$p_{rn,t} = \epsilon_{rn} (Y_{n,t-1} - \lambda Y_n^{\max}) / Y_n^{\max} \quad (A8)$$

Substitution of (A8) into (A7) leads to a model in which national evolutionary patterns - as a result of external forces such as a single market - are reflected to some degree and with some variation at all regional scales, although such evolutions are first most clearly observed in the more prosperous (i.e., high growth) regions and later on in lagging regions. However, because of the saturation levels implied by $Y^{\max}$ the lagging regions may - after a period of increased inequality - be able to catch up at a later stage. Thus it turns out that the above model replicating patterns at different levels of a multi-layer structure has essentially fractal chaotic properties.

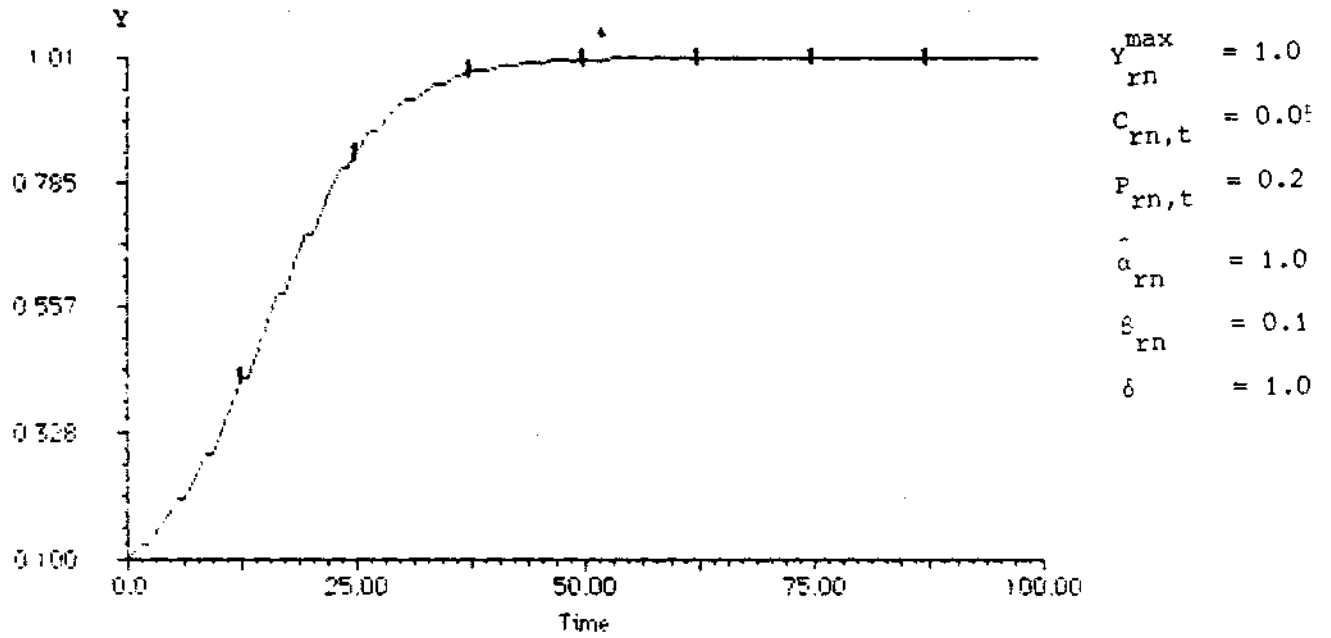


Figure 1. Results of a simulation run for stable growth.

References

- Archibugi, F. and P. Nijkamp (eds.), Ecology and Economy: Towards Sustainable Development, Kluwer Nijhoff, Dordrecht, The Netherlands, 1989.
- Biehl, D., et al., The Contribution of Infrastructure to Regional Development, DG XVII, Commission of the European Community, Brussels, 1986.
- Bröcker, J. and K. Peschel, Trade, Regional Impacts of Community Policies in Europe (W. Molle and R. Cappellin, eds.), Gower, Aldershot, 1988, pp. 127-151.
- Cappellin, R., The European Internal Market: The Internationalisation of Small and Medium Size Enterprises, Paper World Congress Regional Science Association, Jerusalem, 1989.
- Cappellin, R. and P. Nijkamp (eds.), Local and Regional Technology Policy, Gower, Aldershot, 1989.
- Clark, C., F. Wilson and J. Bradley, Industrial Location and Economic Potential in Western Europe, Regional Studies, vol. 3, no. 2, 1969, pp. 197-212.
- Commission of the European Communities, Completing the Internal Market, White Paper, Brussels, 1985.
- Commission of the European Communities, The Economics of 1992, Brussels, 1988.
- Guadrado Roura, J.R., Economic Crisis and Regional Disparities: Challenge of Technological Changes, Regional Dynamics of Socio-Economic Change (G. Gorzelak, ed.), Institute of Space Economy, University of Warsaw, 1988, pp. 123-142.
- Gent, H.A. van and P. Nijkamp, Devolution of Transport Policy in Europe, Deregulation in European Transport Policy (K. Button and D. Pitfield, eds.), MacMillan, London, 1989 (forthcoming)
- Giaoutzi, M., P. Nijkamp and D. Storey (eds.), Small and Medium Size Enterprises and Regional Development, Routledge, London, 1988.
- Heerema, P.J.J. and R.N. Hoffman, Spatial Technology Assessment: Toward a Research Agenda, Paper Colloquium 'Significance of Technological Change for Local and Regional Development', Badhoevedorp, The Netherlands, February 1989 (mimeographed).
- Keeble, D., P.L. Owens, and C. Thompson, Regional Accessibility and Economic Potential in the European Community, Regional Studies, vol. 16, No. 4, 1982, pp. 419-432.
- Laulan, A.M., Social and Cultural Conditions in the Acceptance of New Technologies, Expert Systems and Knowledge Engineering, (T. Bernold, ed.), Elsevier, Amsterdam, 1986, pp. 93-108.
- Malecki, E.J. and P. Nijkamp, Technology and Regional Development: Some Thoughts on Policy, Environment & Planning C, vol. 6, no. 3, 1988, pp. 383-399.

Nijkamp, P. Long-Term Infrastructure Planning, Research Paper, Department of Economics, Free University, Amsterdam, 1989.

Nijkamp, P., Evolutionary Patterns of Urban Production Systems, Belgian Journal of Operations Research, 1989 (forthcoming)

Nijkamp, P. and A. Reggiani, Theory of Chaos: Relevance for Analyzing Spatial Processes, Spatial Processes and Decisions (M.M. Fischer, P. Nijkamp and Y. Papageorgiou, eds.), North-Holland Publ. Co., Amsterdam, 1989 (forthcoming)

Nijkamp, P., S. Reichman and M. Wegener (eds.), Euro-mobile, Gower, Aldershot, 1989.

Nijkamp, P. and I. Salomon, Future Spatial Impacts of Telecommunication, Transportation Planning and Technology, vol. 13, 1989, pp. 275-287.

Peschel, K., The Effects of European Integration on Regional Development - Some Lessons from the Past, Discussion Paper 24, Institut für Regionalforschung, Christian Albrechts University, Kiel, 1989.

Roobeek, A., Een Race zonder Finish, Ph.D. thesis, Department of Economics, Free University, Amsterdam, 1989.

Smidt, M. de and M.C. Conijn, Telematics, Households and Spatial Policy, Paper Colloquium 'Significance of Technological Change for Local and Regional Development', Badhoevedorp, The Netherlands, February 1989 (mimeographed).

Williamson, J.G., Regional Inequality and the Process of National Development: A Description of the Pattern, Regional Policy: Readings in Theory and Applications (J. Friedman and W. Alonso, eds.), MIT Press, Cambridge, Mass., 1975, pp. 183-207.