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The role of public policy in the process of regional convergence



Philippe Martin

1. Introduction

Spatial concentration of economic activities is one of the most salient features of economic development. The almost parallel urge by policymakers to counteract such a trend through public polices is also striking. This is not only reserved to those countries, especially in Europe, which have a long tradition of public intervention. To a lesser extent, the United States has (for example during the New Deal period) put into place policies aimed at correcting uneven patterns of regional development. Public intervention is usually defended on either efficiency or equity grounds. In the case of economic geography, a justification in terms of efficiency implies identifying the various market failures, specific to the issue of space, that make the optimal economic geography differ from the one induced solely by market forces. Although one also needs to show that public intervention will make a better job than market forces, the identification of market failures is a necessary first step to justify public intervention on efficiency grounds. Whereas this type of analysis has been standard for public intervention in the fields of education, technology, pollution, etc., the counterpart for regional policies is much less developed. There are two ways forward: the first is to analyse how some "standard" market failures are modified by the introduction of space and distance and how in turn, this should affect the definition of public policies; the second is to understand how space and distance themselves can be at the origin of market failures.

Another way to justify public intervention is to do it on equity grounds. Some economic agents, workers and consumers, are not mobile and are stuck in poor or declining regions, regions from which mobile factors, some labour and capital, have left. Because of the lower demand for labour in those regions, real wages will either adjust downwards or if real wages cannot adjust due to rigidities on the labour market, unemployment will increase. As consumers, these agents will also see their welfare decrease because some of the goods and services formally produced locally will be produced in the core, richer region. In this case, they will either have to pay a higher price for those goods and services because of the transaction cost involved in importing them from the rich region. In some cases, in particular for services, the transaction cost will become so high that they will become non-tradable so that the diversity of available services will decrease. Also, if the mobile agents are those with the highest human capital and if positive spillovers exist between workers due to localised social interactions, then as mobile agents move away from the poor region, immobile workers will also lose the benefits of these positive spillovers which may imply a decrease in their productivity and therefore in their equilibrium wage. One can say that the root of this problem is then the lack of concentration and the lack of mobility of agents rather than concentration itself. This is partially right and we want to analyse some policy implications of this interpretation. However, one could not go too far along this road because some economic agents will always remain immobile so that the equity motive behind regional policies remains. This raises the question whether regional policies are best equipped to deal with this issue and how to co-ordinate them

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with other redistributive policies. Finally, we want to analyse how regional policies affect economic geography and regional inequalities. One important difficulty is that these policies, due to the very nature of the self-sustaining agglomeration forces at work in economic geography, have extremely complex long-term effects.

2. Searching for market failures in economic geography

Physical space has a strong impact on both technological and pecuniary externalities.

Externalities are the best friend of an economist who wants to defend public intervention, and regional policies are no exception. Both *technological* and *pecuniary* externalities can be put forward in the case of economic geography because physical space has a strong impact on both. The first category occurs when there are technological spillovers that are spatially localised. Several reasons can be advanced. One possibility is the existence of localised technological spillovers such as those studied by Jacobs (1969) and by Henderson and *et al.*, (1995). For instance, the proximity of numerous firms might enable the innovative sector greater scope for observing and analysing the production process and thereby facilitate the creation of new production processes. Silicon Valley is the most successful example of the effect of such interactions between producers and innovators in a particular domain, that of information technology (1). Northern Italian regions are other examples of the force of such localised spillovers. Also, if the innovative sector uses manufacturing sector inputs, its concentration will enable transaction costs and hence the cost of innovation to be reduced. In this case, the positive externality arising from spatial concentration is pecuniary, operating through an effect on prices (see Martin and Ottaviano 1996, for such a model).

A further type of externality comes from the fact that firms (and in general owners of mobile factors) do not take into account the welfare of other agents when they choose where to locate. In particular, they do not take into account the welfare of those agents who are immobile. The reason is that they do not get the whole benefits linked to their location decisions. Here the market failure is due ultimately to the fact that certain agents do not move. If no congestion effects appear, then full concentration would not create any problem. Hence, if this were the only market failure, public policies that promote mobility of workers should be enough to respond with problems caused by agglomeration. Indeed, the fact that mobility (both between regions of a given country and between countries) is much lower in Europe than in the US explains why the location of economic activities has become a more important policy issue on this side of the Atlantic. From the policy point of view, housing and tax policies that facilitate the mobility of workers should therefore be regarded as part of the regional toolkit. The fact that regions can be specialised in specific industries also suggests that low inter-sectoral mobility of workers adds to the welfare cost of spatial concentration. This means that policies that facilitate inter-sectoral mobility such as education and training policies in poor regions should be reinforced.

In a recent paper, however, Matsuyama and Takahashi (1998), show that the freedom to move can in fact be self-defeating in certain circumstances. They show, in fact, that agents would be better off if their freedom to move were taken away. The reason is that as agents move to the agglomeration in pursuit of a better life because of the diversity of services and goods provided there, the production of the goods from the poor region (now in "the middle of nowhere") declines and the standard of living of all agents drops. Here, the market failure is the absence of co-ordination between the

1) The work of Jaffe, Trajtenberg and Henderson, (1993) shows that the citation and use of patents is very localized. This is very strong evidence that knowledge spillovers are themselves very localized.

different agents rather than immobility *per se*. Another market failure that is not solved by the mobility of agents, and can even be aggravated by it, is congestion externalities.

Space itself can be at the origin of market failures because it leads to imperfect competition.

Finally, space itself can be at the origin of market failures because it leads to imperfect competition. The reason, first analysed in the context of the Hotelling model, is that distance between producers gives firms a relative market power over consumers who are located nearby. In this case, as transaction costs go down, competition between firms is reinforced and firms will react by differentiating their products along non-geographical characteristics. This important insight has been analysed by Gabszewicz and Thisse (1986) and Scotchmer and Thisse (1992). Some of its implications for regional policies may not have been entirely exploited yet. If regional policies reduce transaction costs, then they take away the monopolistic power of firms that is based on distance, and increase the incentive to regain monopolistic power through product differentiation. This latter type of differentiation may have some positive impact on welfare if consumers value diversity.

3. Equity considerations

What is the impact of economic geography on equity, and can regional policies be justified on this ground? This depends very much upon: the relative distortion effects of regional policies and of redistributive fiscal policy on individuals; the mobility of factors (capital and labour); and, the extent of inequality among individuals in the population of both the poor and the rich regions.

To make equity considerations a possible justification for regional policy, we must assume first that non-distortionary lump sum transfers are not possible. Otherwise, if a region experiences a delocation of its economic activities and could be compensated in this way by another region, then the question of regional inequalities would be easy to solve. The standard view is however that such redistribution is indeed not possible due, in particular, to information problems. In that case it can be argued that regional policies are less distortionary than the income taxes needed to compensate individual losers of changes in economic geography. However, regional policies add a supplementary distortion in the sense that they alter economic geography through the location decisions of firms. In recent papers (Martin 1999a and 1999b), I have argued that a trade-off exists between equity and efficiency at the spatial level so that public policies which, through taxation and subsidies, induce firms to relocate in poor regions may reduce the overall efficiency of the economy. An indication of these arguments is given below.

The spatial equity problem also depends very much on income inequality in the population. The more inequality among the individuals, especially between workers and capital owners, the more acute the problem of spatial inequality will be. This can be seen in a simple model with two regions and two factors, mobile capital and immobile agents such as in Martin and Rogers (1995). Workers of the monopolistic manufacturing sector and of the perfect competition sector earn the same nominal wage in the two regions. This is because the goods produced in the perfect competition sector are traded with no costs so that nominal wage rates are equalised. What determines their welfare is their real wage which also depends on the number of firms in each region. Workers in the region with the highest number of firms gain because they pay lower transaction costs as many of the goods are produced locally. This decreases the price index and therefore increases the real wage in that region.

Facilitating capital mobility between the two regions, for example by eliminating legal barriers to plant closures, have a different impact on the welfare of the different agents. If firms relocate from the poor to the rich region, the price index will increase in the poor region and decrease in the rich region. However the return (profits in the monopolistic sector) to capital will increase in the poor region and decrease in the rich region. The reason is that as firms move out of the poor region, local competition will decrease and the opposite will occur in the rich region. Another way to say this is that firms from the poor region will move out if profits are higher in the rich region up to the point where returns are equalised in the two regions. Unambiguously welfare of workers in the poor region decreases: their nominal wage is tied by factor equalisation due to free trade in the perfectly competitive sector, but the price index increases so that their real wage decreases. The inverse happens for workers in the rich region so that inequality between workers of the two regions increases when firms are free to choose location.

The equity motive behind regional policies is not as straightforward as it seems because it requires a choice between types of inequality.

The situation for capital owners is more ambivalent. The nominal income of capital owners in the poor region rises. The relocation of some firms to the rich region lowers competition and increases the profits of the firms that they own. However, as consumers, they may loose because the price index increases in the poor region. Following the methodology of Martin and Rogers (1995), it is possible to show that capital owners in the poor region will gain with relocation if transaction costs are low enough and if the extent of competition (measured by the inverse of the degree of elasticity of substitution between varieties in the monopolistic sector) is not too high. The exact reverse result holds for capital owners in the rich region. However, because the nominal income of capital owners in the poor region rises with free relocation, the inequality between workers and capital owners in the poor region (measured in terms of real income or welfare) will always increase when firms choose freely their location. This may be an important argument in favour of regional policies. However, note that the concentration process in the rich region will, by the same reasoning, decrease inequality between workers and capital owners in that region because as competition increases, profits will decrease (to equalise those in the poor region by an arbitrage process) as well as incomes of capital owners. This implies that regional policies that would tend to impede this relocation process will benefit immobile workers of the poor region but will harm immobile workers of the rich region. It would decrease inequality in the poor region and increase it in the rich region. The equity motive behind regional policies is thus not as straightforward as it seems because it requires a choice on reducing one type of inequality at the expense of another type of inequality.

Another important result is that the extent to which inequalities will be increased by letting the concentration process free will depend crucially on the distribution of factors of production. The more unequal the distribution of mobile capital in the population the more the concentration process will exacerbate inequalities in the population. The reason is that if immobile workers can relocate some capital, then the welfare loss due to higher a price index when firms relocate outside the region will in part be compensated by an increase in their income from the higher return to capital outside the poor region.

Equity considerations are important for analysing regional policies. However, the question: "Do regional policies decrease inequality between poor and rich regions?", is not the same as: "Do regional policies improve welfare of agents in the poor regions?". To see this we will use two simple examples.

In a similar framework as the one described above, suppose that we look at the welfare impact of a decrease of transaction costs between a poor and a rich region. This could be the result, for

example, of building a new highway. The impact on the two regions of decreasing transaction costs in this way is modelled in more detail in Box 1. In this model an improvement of infrastructure facilitating trade leads to relocation of firms from the poor to the rich region. Firms can now better exploit economies of scale in the larger market and still export to the poor region as trade is facilitated between the two regions (2). Hence, if we were to look at regional GDP we would see a fall in the poor region and an increase in the rich one. From that point of view, one could interpret this policy as increasing inequalities between the two regions.

But what is the impact on welfare of a worker in the poor and the rich region? Lower transaction costs affect welfare in two different ways. The direct effect, lower costs for imported goods, is always positive for the poor region (3). At the same time, industrial location from the poor to rich region has a negative indirect impact on welfare in the poor region as more goods must be imported at a cost. In this particular model, the direct benefit is always greater than the indirect loss for the poor region. Hence, the example shows that, even though on *equity* grounds a policy of lowering transaction costs may not be called for, it can be defended on the grounds that it *increases welfare* of the poor region. *A contrario*, even though new economic geography insists on the concentration effects of lower transaction costs, its normative implications are certainly not to promote higher transaction costs.

Nevertheless, it is true in such models that if a planner could change economic geography, that is, could choose the number of firms in each region, equity considerations would entail to increase the number of firms in the poor region at the expense of the rich region (this again assumes that no lump sum transfers are possible as these may dominate such a distortionary policy). However, this result itself is not general. Martin and Ottaviano (1999) show that the existence of localised technology spillovers introduces an ambiguity. In this case, higher concentration in the rich region increases the extent of technology spillovers (firms being close learn more from each other) which increases the growth rate and therefore benefits the poor region. Martin and Ottaviano (1999) report that the net effect on welfare in the poor region depends in particular on the level of transaction costs, the importance of localised spillovers and on the inequality in capital endowments between the two regions. When transaction costs between the two regions are low, the positive effect of concentration will dominate because in this case, the fact that more goods have to be imported from the rich region is not very important. The net effect of concentration is also positive when spillovers are strong enough. Finally, if the poor region has initially little capital (or the inequality in capital endowments is high), then the positive effect will again dominate. This is because higher growth decreases profits of existing firms due to stronger competition: as the poor region has little capital the negative effect of lower profits is weak and the positive effect of stronger competition is important. Hence, the existence of localised spillovers, which induces a trade-off between regional equity and efficiency, may be an important factor in choosing the type of regional policies to implement.

The existence of localised spillovers, which induces a trade-off between equity and efficiency, may be an important factor in choosing the policies to implement.

To summarise, we have seen that a policy that reduces transaction costs between regions may improve welfare in the poor region even though it induces more spatial concentration and inequality. Moreover, regional policy that induces firms to move to the poorer location (for example through subsidies) may not be always welfare improving for the poor region, especially if spillovers are

2) See Combes and Lafourcade (1999) for a study that shows that the reduction of transaction costs in France has indeed led to more industrial concentration.

3) This is an overstatement because the infrastructure must be paid for. Implicitly, we assume that infrastructure projects are paid for by the rich region.

Reducing transaction costs between regions will induce more concentration, but will weaken the detrimental effects of spatial concentration.

strong, inter-regional transaction costs are low and inequality in capital endowments between regions is high. If one believes that this characterises the European situation, then regional policies that focus on reducing transactions can be legitimate, but not for the reasons that are usually advanced by policy makers. Reducing transaction costs between regions will induce more concentration, but will weaken the detrimental effects of spatial concentration. It will increase efficiency and growth and therefore improve welfare in the poorest regions. However, if the ultimate goal of regional policies is not only to improve welfare, but also to decrease inequalities between European regions, then policies that focus on human capital (education and training) would be more appropriate.

Box 1. A model of lowering transactions costs

The important assumption of this model (see Martin and Rogers, 1995, for further details) is that the manufacturing sector experiences increasing returns due to the fact that each firm requires a fixed amount of capital. Because capital is perfectly mobile, firms can choose to locate production in either a rich (r) or poor (p) region. K_r and K_p are the respective stocks of capital owned by the rich and the poor region and L_r and L_p are the number of immobile workers in those regions. We assume that $K_r > K_p$ and $L_r > L_p$. There are iceberg transaction costs τ on trade on manufacturing goods between the two regions and $\rho = \tau^{1-\sigma} < 1$, is a usual transformation (σ is the elasticity of substitution between goods in the monopolistic sector) so that an increase in ρ implies an improvement in infrastructure facilitating trade between the two regions. In equilibrium, the number of firms locating production in each region is:

$$(1) \quad n_r = \frac{K_r+K_p}{L_r+L_p}\left(\frac{L_r-L_p\cdot\rho}{1-\rho}\right); \; n_p = \frac{K_r+K_p}{L_r+L_p}\left(\frac{L_p-L_r\cdot\rho}{1-\rho}\right)$$

This equilibrium location is found by equating supplies and demands on goods markets and by an arbitrage condition that requires that the profit of a unit of capital be equal in both regions so that no relocation can be profitable. Equation (1) shows that more firms locate in the rich region than in the poor one. It is easy to check that an increase in ρ leads to relocation of firms from the poor to the rich region.

Welfare is given by the equations:

$$(2) \quad V_r = C\,(n_r + n_p\cdot\rho)^{\frac{\alpha}{\sigma-1}}; \; V_p = C\,(n_p + n_r\cdot\rho)^{\frac{\alpha}{\sigma-1}}$$

where C is a constant and α is the share of manufacturing goods in the utility function. These equations just say that welfare depends on industrial location (n_r and n_p) and on transaction costs. Because ρ is less than 1 (some of the goods are lost in the process of transporting them between the two regions), welfare increases with the number of firms located in one's own region (as $n_r + n_p$ is constant and equal to the total capital stock, K_r+K_p).

Using equations (1) and (2), welfare in the poor region is:

$$(3) \quad V_p = C\left[\frac{L_p\,(K_r+K_p)}{L_r+L_p}\right]^{\frac{\alpha}{\sigma-1}}(1+\rho)^{\frac{\alpha}{\sigma-1}}$$

Hence, even though lower transaction costs (higher ρ) induces industrial relocation from the poor to the rich region, the net effect is always positive for welfare in the poor region.

4. Demand and supply effects of regional policies

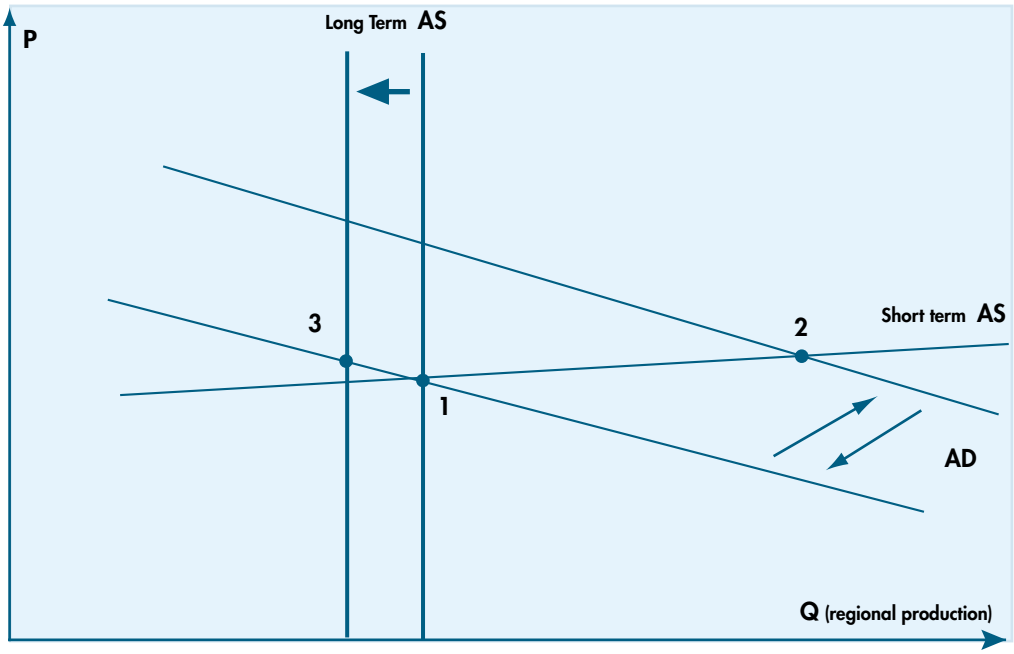
Regional policies that finance infrastructure projects have both demand and supply effects. The demand effects are mostly short-term effects whereas supply effects are more medium- to long-term. The demand effects of infrastructure projects such as roads, highways and other heavy infrastructures that are often financed through regional funds are quite clear. With a simple Keynesian framework in mind, it is easy to understand that this localised spending increases aggregate demand in the region. The effect is both direct and indirect through the Keynesian multiplier. The effect will be stronger the higher the unemployment rate and the lower the utilisation rate of factors of production such as capital in the region. Of course, the demand effects are not permanent, and once the infrastructure projects are over, the demand effects are reversed. However, they are certainly the most visible and the easiest to analyse and quantify. Indeed, the European Commission (1999) insists on these effects and use a Keynesian econometric model at the level of the country to quantify them. They find that for the period from 1989 to 1999 the contribution of the EU transfers has been to increase the average growth rate by a maximum of 1 percentage point (Greece and Portugal during the period from 1994 to 1999) and a minimum of 0.3 percentage points (Spain during the period from 1989 to 1993).

Regional policies that finance infrastructure projects have both demand and supply effects. The demand effects are mostly short-term.

These results are very difficult to interpret for two reasons. First, they measure at best the upper limit of the effect of regional policies. The reason is that they attribute any gap to the past trend of growth to the effect of regional policies. But we know that during this period where the integration process was very strong the convergence process was also very strong due to large private capital inflows to these countries (except for Greece). These inflows can well be explained in a simple neo-classical model with capital movements and convergence. Second, these studies look only at the impact on countries and not regions. This also is problematic because several studies (such as Neven and Gouyette, 1994) insist on the fact that convergence in Europe occurs between countries, but not between regions. De la Fuente and Vives (1995), for instance, building on the work of Esteban (1994), suggest that around *half the income inequality between the regions of the EU is accounted for by domestic inequality between regions within individual countries*. Thus, during the 1980s and 1990s per capita income differentials have been narrowing between countries, but widening between regions within individual countries (Martin, 1998). The EU studies provide very little information on the impact of regional policies on *regional* inequalities in Europe.

Furthermore, in the context of regional policies, it is more important to study the supply effects. As the earlier discussion has revealed, the long-term supply effects may be exactly opposite to the short-term demand effects. The dynamics of this evolution can be seen with a traditional aggregate demand/aggregate supply graph. In Figure 1 we illustrate this for a poor region that receives funds to finance infrastructure connections with a richer region. In the short-term, the aggregate supply curve in the poor region may be almost horizontal because of slack capacity and because some capital will move to the poor region when aggregate demand increases. Hence, the new infrastructure spending has a high positive short-run impact on output (output goes from point 1 to 2). However, this is temporary. The long-term effect is uncertain: The economic geography message is that the reduction of transaction costs may induce firms to concentrate in the rich region so that aggregate supply in the poor region is reduced (in which case output goes to point 3).

Figure 1.



The long-term supply effects may be exactly opposite to the short-term demand effects.

The distinction of demand and supply effects is also important for political economy reasons. Because the demand effects are short-term effects and they are most important for heavy infrastructure, and because the political horizon is also a short-term one, the strong bias in favour of heavy transport infrastructure in regional policies can be explained easily.

5. Conclusion

We have seen that public policies aimed at altering economic geography and regional development have multiple and sometimes contradictory impacts. The reason is that economic geography is key for many economic issues. It is important as a determinant of welfare, inequalities, productivity, growth and innovation. Moreover, economic geography is itself endogenous and public policies that influence transaction costs, innovation, or mobility of factors will change the location decisions of economic agents. Because of these potential self-reinforcing mechanisms at work, analysed earlier by Faini (1983) and Krugman (1991), it is also likely that regional policies have compound effects. If the dynamics of economic geography can be interpreted as one equilibrium loosing suddenly its stability at the benefit of an another equilibrium, this implies that regional policies will be most of the time useless, though extremely powerful in some rare circumstances. If agglomeration is due to a self-sustaining mechanism, through vertical linkages for example, then giving a small advantage to the poor region (for example through subsidies) will in no case alter the stability of the equilibrium. However, in the case where a new economic geography is in the process of being made, because of some drastic exogenous change in the economic environment or because new activities are created, then public policies may be the exogenous force that gives a key advantage to one region or to one stable equilibrium out of many stable and possible equilibria.

Regional policies may have very little impact most of the time, but a strong one in some very specific circumstances. This means the policy mistakes are going to be numerous.

It may be that the process of European integration is exactly such a moment where previously stable equilibria are redefined and where new equilibria emerge. The experience of call centres in France is also revealing. This is a rather new activity which by itself does not require to be close to a specific region. The city of Troyes in Champagne has been relatively successful to attract call centres by a specific training policy and a real estate policy aimed at favouring this activity. To a certain extent the example of Brittany with some information technologies linked to telecommunications is similar; training policy was again a key element. If, indeed, regional policies have very little impact most of the time and a strong one in some very specific circumstances, then policy mistakes are going to be numerous because the information requirement is too severe. This does not imply that regional policies have no use, but that these compound effects should be carefully integrated in the choices made.

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