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ABSTRACT

Spillovers from national industrial policies can cause helpful or harmful competition among policy makers and helpful or harmful interactions among the targeted industries. *As a result, it is not in general possible to say whether industrial policy coordination is good or bad. However, reaching agreement at the EU level on any type of policy – trade policy, monetary policy or industrial policy – is costly in terms of time, information, and political goodwill. The contrast between the vagueness of the benefits of coordination and the surety of the decision-making costs suggests that the EU has no need to set up a new institutional structure for coordinating industrial policy. In the few cases where the merits of coordination are obvious, such as public spending on R&D, they will be obvious to all and* ad hoc *cooperation will work.*

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Coordination of industrial policy in the European Union

1. Introduction

Richard Baldwin

Philippe Martin

Europe has long worried about its industrial competitiveness. The first page of the 1956 Spaak Report – a report that became the blueprint for the economics in the Treaty of Rome – worries about how Europe's industries could stand up to US competition:

L'Europe bénéficie pour le développement de sa productivité d'une assimilation rapide des techniques à l'écart desquelles les circonstances l'avaient tenue. Dans l'état présent de son organisation économique, elle ne saurait prolonger ces progrès et soutenir par ses propres forces ce rythme d'expansion. Trois exemples feront concrètement apparaître ce que signifie, face aux possibilités du monde moderne, le cloisonnement européen des marchés. Il n'y a pas une entreprise automobile en Europe qui soit assez grande pour utiliser de manière économique les plus puissantes machines américaines. Aucun des pays du continent n'est capable sans apports extérieurs de construire de grands avions de transport. Dans le domaine de la science atomique les connaissances acquises à grands frais dans plusieurs des pays d'Europe ne représentent qu'une faible fraction de celles que les États-Unis mettent maintenant librement à la disposition de leur industrie et des autres pays; et il faudrait des années pour produire quelques milliers de kilos de cet uranium enrichi dont l'Amérique vient d'annoncer qu'elle pouvait mettre à la disposition de son industrie et du reste du monde un surplus de 40 tonnes.

Tighter European integration has been one means through which Europe has promoted its industry, but this has sporadically been accompanied by a concern for more direct industrial policy.

Industrial policy was all the rage in the 1980s, fostered by academic writings on the so-called strategic trade policy[1], and the apparent success of Japan's industrial policy. The 1990s, however, saw industrial policy fall from favour as free-market thinking was explicitly or implicitly embraced by all of Europe's mainstream political parties. The emergence of East Asia, China in particular, and the accession of ten new, low-wage, low-productivity nations, however, has revived concerns that Europe is de-industrialising. The response has been to embrace bold goals in the Lisbon process. As part of this, industrial policy is back on the front burner of policy makers' stoves[2].

The target of industrial policy is to influence the volume and composition of Europe's industrial output, primarily its manufacturing output. In general, the aim is to boost the volume of production and/or jobs, although more subtle analysts focus on promoting 'good jobs', not just any jobs. So what then is industrial policy?

Moving from principles to practice, it is worth noting that everything affects everything in a general equilibrium system. Any policy in any factor or goods market in any nation in the world could, in principle, affect the volume and composition of Europe's industrial output. But taking industrial policy to mean every policy in the world is to rob the concept of its analytic content. Moreover, most policies have negligible effects on Europe's manufacturing sector, and so can be safely excluded from the list. But because everything could affect everything, there can never be a thin red line dividing policies that are industrial policies from those that are not. This, of course, is why it is absolutely impossible to develop a definitive definition of industrial policy.

1 See Brander and Spencer (1985) and Leahy and Neary (2001) for a more a recent analysis.
2 See also Rodrick (2004) for recent academic arguments in favour of industrial policy.

Failing a perfectly general definition, we shall fall back on the Humpty-Dumpty principle.[3] The words mean what we say they mean. In particular, we shall consider all policies that have a significant effect on Europe's industrial sector to be an industrial policy. The definition of 'significant' will be flexible, so we are not forced to disregard policies that we believe are relevant. This casts the net rather widely, but we believe that is the only way to view coordination.

The aim of this paper is to consider the advantages and disadvantages of coordinating industrial policy at the EU-wide level, either by outright delegation – as in the case of trade policy (the Common External Tariff is set at the EU, not national level) – or other looser forms of coordination. We start in Section 2 with the economic pros and cons of coordinating industrial policies. As the reference to pros and cons might suggest, we will see that coordination could be helpful in some circumstances, but harmful in others. We will also argue that the justification for coordination is stronger in the case of so-called specific (or vertical) industrial policies, but that coordination in these cases might well mean an agreement among nations to refrain from such policies. Section 3 zooms in on cases where policy coordination makes sense and asks whether it would not be even better to delegate such policies to a supranational authority, as it is done, for instance, with trade policy or monetary policy in the eurozone. Section 4, which returns to looser forms of coordination, examines how the degree of spatial and sectoral spill-over effects and of international factor mobility influences the pros and cons of coordinating industrial policies. Section 5 concludes.

2. Coordination: pros and cons

2.1 A simple analytical framework

The classic strategic-complement, strategic-substitute framework offers insights into the pros and cons of industrial policy coordination that are relevant, correct, but not obvious beforehand.

Good theory helps organise one's thinking about the insanely complex world we live in. To do this, the theory must be relevant and correct, but not obvious. Many economists skip the first point and build up the third point by using confusing notation and overly elaborate frameworks. The best theory is where the relevance is self-evident and the theory is correct and not obvious beforehand, but becomes obvious after the intuition is provided. Producing such theory is a tall order, but fortunately there is almost nothing new under the sun when it comes to coordination issues in general. The classic paradigm is the strategic-complement-strategic-substitute framework.

We start, as all good theory does, by radically simplifying the world in order to focus on essentials. This prevents muddled thinking when we start adding complexities back into the mix.

Imagine that the world consists of two symmetric countries with governments that are perfect – they know everything about the world that matters and they care only about their country's wellbeing. Moreover, suppose they can sign enforceable contracts with other governments. As it turns out, this case is too simple to help us understand real-world complexities since in this case, cooperation can never be bad. If international spillovers of any sort lead cooperating nations to choose policies that they would not without cooperation, then the world is a better place. The argument rests on a simple revealed preference argument. Governments know best and care only about wellbeing, so if they choose something with coordination that they would not have chosen without coordination, then the coordinated outcome must be better. To paraphrase Dr. Pangloss, "Coordination is always for the best, in the best of all possible words."

3 As the great egg said to Alice: "When I use a word," Humpty Dumpty said, in rather a scornful tone, "it means just what I choose it to mean -- neither more nor less." (Lewis Carroll, *Through the Looking Glass,* Chapter 6).

Unfortunately, while there are such perfect public servants in this world, not all government officials and politicians are totally selfless. Indeed, assuming that all politicians are interested in things other than the welfare of their electors is probably closer to reality than assuming they are all perfect public servants. For example, it is quite common for politicians to systematically favour politically powerful special interest groups – e.g., granting them tax breaks, subsidies, and favourable laws – even when this is bad for the average citizen. This is at least as true in the area of industrial policy as it is in other areas of economics.

Allowing for this type of political economy distortions – i.e., a situation where there is a wedge between the government's objectives and social welfare – we can easily get second-best results where coordination actually makes things worse. This point is illustrated with the help of Figure 1, which illustrates the link between the industrial policies (IP) of two nations, Home and Foreign.

The basic idea of strategic complements in the context of industrial policy is that the more one government does, the more the other wants to do.

The top pair of lines shows the best-reaction functions of a government when industrial policies are strategic complements. The basic idea of strategic complements in the context of industrial policy is that the more one government does, the more the other wants to do; production subsidies or tax competition would be good examples. Loosely speaking, strategic complements reflect cases of negative policy spillovers. That is, when the Home government chooses its policy uncooperatively, the higher the Foreign government's policy choice, the higher the optimal response for the Home government, and so on. In these circumstances, cooperation will lead to a lower level of policy in both nations. In Figure 1, this can be seen by the fact that the uncoordinated equilibrium, *E1*, is further out on the 45-degree ray and so involves a higher level of policy for both nations (since we have assumed that nations are symmetric, we do not have to show best-reaction functions for both).

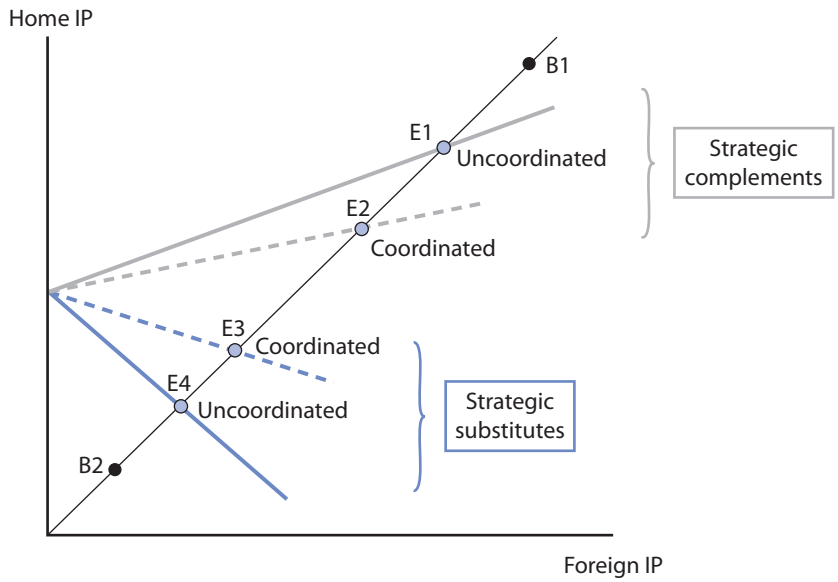
Is the coordinated equilibrium, *E2*, better than the uncoordinated equilibrium, *E1*? In general, there is no unambiguous answer to this question. If the 'bliss point', i.e., the optimal policy choice from a social welfare perspective is *B1*, coordination moves the outcome in the wrong direction, and the answer is 'no.' If the bliss point is *B2*, coordination moves things in the right direction, and the answer is 'yes.' Since the bliss point could, in principle, be anywhere, we can make no generally valid comments on the advisability of coordination.

One example where coordination moves both nations in the right direction might be production subsidies. In the absence of coordination, both countries choose a high level of production subsidies that in equilibrium distort competition. Coordination in this case would move both countries towards a lower level of subsidies (closer to *B2*). One example where coordination might be counterproductive is tax competition. The distortion created by the externality at the international level (the attempt to attract mobile capital at the expense of the other country) generates too much tax competition. However, suppose that at the national level another distortion (political economy for example) exists such that taxes on capital are too high so that the bliss point is one where there are low taxes or high tax competition (point *B1*). The important point is that without coordination the two distortions more or less compensate each other. With coordination between the two countries, the international distortion is removed leaving the national one alone and the outcome is further away from the bliss point. In the next section, we spell out more precisely another example where coordination may be counterproductive[4].

4 The possibility of counterproductive international coordination has been extensively studied in the field of international macroeconomics (see Rogoff 1985, Canzoneri and Henderson 1991, and Canzoneri *et al.* 2006). In Canzoneri and Henderson (1991), it is also shown that if only a subset of countries (such as the EU) cooperates, then this limited cooperation may be counterproductive. The reason is again that coordination among EU members eliminates one distortion. This distortion may have actually compensated for another one with another group of countries. One could also apply this example to the issue of industrial policies.

Note that we have focused on political economy distortions, but the governments' choices could deviate from social optimality for many reasons – information problems being a leading contender.

Figure 1. Coordination *vs.* uncoordinated outcomes



The basic idea of strategic substitutes in the context of industrial policy is that the more one government does, the less the other wants to do.

Strategic complements, however, is not the only possibility. Many industrial policies are marked by a free-rider problem, where the more one nation does, the less the other nation wants to do: nations' policies are thus strategic substitutes. Loosely speaking, strategic substitutes imply positive policy spillovers; R&D policies in the presence of knowledge spillovers are a good example. In this case, the reaction functions slope downward, and the coordinated policy outcome is beyond the uncoordinated one since each nation takes account of the positive benefit of its policy on the other nation. Note that the ordering of coordinated and uncoordinated outcomes is reversed: coordination leads the two symmetric nations to raise their level of policy, they settle in *E3* rather than *E4*.

Is coordination a good idea here? Again the issue depends on the bliss point. If bliss would involve a high level of policy, coordination improves the situation (point *E3* is closer to *B1* than *E4* is). R&D policies would be an example of this (see section 2.3.2 on global public goods). If bliss would involve little policy, for example *B2*, then coordination is a bad thing. Subsidies for innovation policy for some politically sensitive sectors (say defence industry) might be a case. Innovation produces positive knowledge spillovers at the international level so that coordination would lead to more subsidies for innovation. However, one could make the argument that some domestic political distortion leads to too much subsidy for innovation in certain sectors (again, say, defence or other 'strategic' industries). Which distortion is most important in practice is difficult to evaluate in general, but the important point here is that international coordination is not always going to lead to a better situation in a world where many international and domestic distortions exist. Another way to say this is that coordination is not necessarily a good idea if the international distortion eliminated by coordination actually compensates for a national distortion.

Still, it is easier to think of situations where well-informed and well-intentioned governments could improve the outcome with coordination. We start, therefore, in the next sub-section with

two examples of harmful coordination. One is called 'jurisdictional competition' and the other 'task allocation among government levels' – both issues are well known from the public finance literature. Situations where coordination is helpful are left for sub-section 2.3.

2.2 Harmful coordination

2.2.1 Jurisdictional competition and Europe's anti-industrial policy

European voters demand a high level of social protection from their governments and they are willing to pay for it through taxes, or at least it seems so from watching the electoral competitions on the Continent. One extremely important source of the money needed to pay for this comes from a very high tax on employment, often called 'social charges.'

Taxes discourage the taxed activity, so it is not surprising that labour economists consistently find that employment taxes reduce employment. For this reason, many economists view employment taxes as an inferior way of raising the money governments need to pay for the social policies that voters want, especially since high employment levels are on every government's wish list. The reasons why this inferior tax is used so widely are complex, but one of the most important ones is that people do not understand the true burden of the tax. Without thinking hard about the matter, it appears that corporations pay a large fraction of the tax. Many voters therefore believe that social charges are a good way of forcing corporations to pay their fair share. But corporations are no one, so corporations cannot pay anything. The burden of the tax either falls on the firm's shareholders, workers, or customers. Since both customers and shareholders have a broader range of alternatives, prices adjust so that much of the burden of the tax – the 'incidence' in public finance jargon – falls on the workers. In particular, such taxes lower the take-home pay of workers.

Taxes on employment, that is, social charges act as an anti-industrial policy because industrial goods are traded and service sector goods are not.

But what has this got to do with industrial policy coordination? As it turns out, social charges act as an 'anti-industrial policy' because industrial goods are traded and service sector goods are not (the share of output of agriculture in the EU is so small that we can ignore it). To see why this is so, let us look at the basic economic impact of wage and non-wage costs on employment. To get to the core of the argument, we start by making strong assumptions that radically simplify the range of issues at hand. We add back some important aspects of reality after having established the basic points.

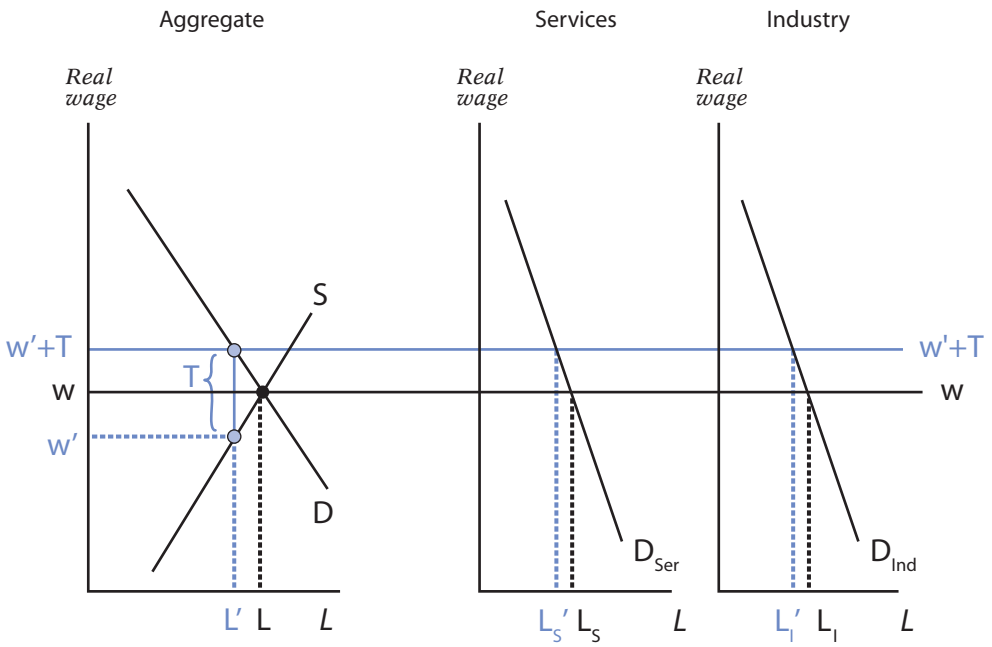
Consider a single nation and start with the unrealistic, but convenient simplifying assumption that labour markets operate like other markets (i.e., wages adjust so that there is no involuntary unemployment). Moreover, to keep things simple, suppose the nation starts without any social policies and initially is closed to trade. The equilibrium, shown in the left panel of Figure 2, is where the real wage is w and employment is L.

Now suppose the government adopts a whole series of social policies, for example limits on working hours, obligatory retirement benefits, maternity leave, sick leave, six weeks of annual holidays, and so on. These policies would undoubtedly be good for most workers. Indeed, most Europeans view these as necessities, not luxuries. Yet, however good these policies are for workers and the society at large, such policies are expensive for firms. To be specific, suppose that they raise the cost of employing workers by T euros per week. What happens to wages and employment?

The new equilibrium wage paid to workers – the take-home pay – falls to w', while the cost to the firm of employing a worker rises to $w'+T$. Hence, the social policy 'tax' drives a wedge between the wage cost to the firm, $w'+T$, and workers' take-home pay, w'. It is useful to think of the tax being

paid partly by consumers (in the form of higher prices) and partly by workers (in the form of lower take-home pay). The firms we consider here are competitive and so cannot bear any part of *T*; they earn zero profits before and after *T* is imposed. Or to put it differently, if *T* did lower the rate of return on firms' capital, capital would move elsewhere. The new equilibrium employment in the economy is *L'*. The social policy thus leads to a drop in aggregate employment (left-hand panel of Figure 2). As we are assuming for now that labour demand in both sectors responds in the same way to changes in the wage cost to firms (see the middle and right-hand panel of Figure 2), the aggregate drop in employment splits evenly between industry and services.

Figure 2. Social charges and jobs in a closed economy.



In setting the level of social charges, the government needs to trade off political expediency (suggesting high charges) against employment effects (suggesting low charges).

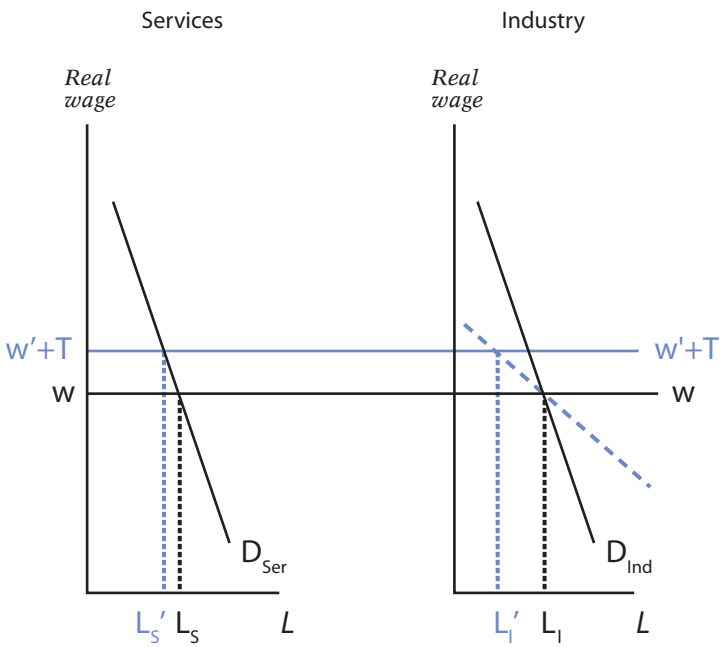
How high will the tax be? On one hand, the government would like a high tax since it is a politically convenient way of paying for social policy (the true effects of the tax are not very transparent to voters). On the other hand, the government will not be happy about the job destruction. The tax chosen presumably is the politically optimal trade-off between these conflicting objectives.

Note that this is one of those situations where political expediency leads governments to choose a level of employment taxes that is too high from the social perspective. Taxes like a value-added tax could raise the same revenue without destroying jobs, but voters find it much easier to understand the impact of the VAT, so politicians 'hide' the taxes in the form of social charges.

Europe's economies are far from closed. So let us examine how openness to international trade changes the anti-industrial policy impact of social charges. A simple way to introduce openness in this sort of diagram is to flatten the labour demand curve. The labour demand curve in a particular sector, industry for example, is downward sloped for two reasons. First, a higher real wage leads to capital-labour substitution and thus lowers labour demand, but this channel is not affected by openness. Second, higher wages mean higher prices, resulting in lower sales and less of a need for workers. The extent to which higher prices translate into lower sales and thus employment depends intimately on openness. If the sector's customers have ready access to imported alternatives, each price rise yields a greater drop in labour demand. Or, to put it simply, the labour demand curve gets flatter. This is shown by the dashed labour demand curve in the right-hand panel of Figure 3.

As trade becomes freer, the labour demand curve in industry gets flatter, but little happens to the labour demand curve in the services sector since most services are non-traded and, thus, firms have greater scope to pass on higher wages in the form of higher consumer prices. What all this means is that unless social charges are reduced, progressively more open markets foster a shift in employment from the traded goods sector (industry) to the non-traded goods sector (services).

Figure 3. Social charges and jobs in an open economy



In short, high social charges are an anti-industrial policy since they tend to shift jobs out of industry and into non-traded goods sectors like services, and the impact gets worse as markets progressively open to international trade. The intuition should be clear. High non-wage labour costs force firms to raise prices. In non-traded goods sectors, all firms in the market face roughly the same need to raise prices, so the overall impact on any particular firm is dampened. In traded goods sectors, customers have an alternative to paying the higher price charged by local firms – they can buy abroad. Thus, a given increase in non-wage cost has a systematically more negative impact on the competitiveness of firms in industry than it does on services firms. The natural result is a shift in the nation's employment pattern from industry to services.

The anti-industry impact of social charges gets worse as markets progressively open to international trade.

It is interesting to note that the force with which this logic imposes itself on a particular nation depends upon how open it is. Small nations like Ireland, Finland, and the new member states of the European Union have little in the way of sheltered markets, so the cost of not reforming is much higher for them than it is for large nations like Germany and France. Little wonder, therefore, that the small nations of Europe have tended to be the ones who have reformed the fastest (and reaped the most benefits from globalisation).

How have governments reacted to this? In answering this question, we finally get to the issue of jurisdictional competition – more precisely: the merits of it. Apart from bemoaning this aspect of globalisation while embracing globalisation in general, European governments have tended to moderate the rate at which they have increased social charges, and in some cases they have decreased them. Since social charges are an economically inefficient way of raising taxes, this tendency has probably improved Europe's economic welfare, even if it has posed problems for

politicians who were used to hiding much of the tax burden from voters by way of social charges. In short, social charges are a good example of where governments choose a policy level that is too high.

Coordination on social charges is bad. Other factors speaking against coordination include 'diversity across EU nations' and 'informational advantage of national governments'.

If European governments coordinated on social charges – that is, required a minimum level – the average level of social charges would surely increase. The point is that the industrial job losses generated by higher social charges, especially in traded goods sectors, is a mechanism that prevents European governments from hiding an even greater slice of the tax burden in this economically inefficient but politically expedient tax. Coordinating on a minimum level of social charges would allow governments to raise the social charges with less loss of employment. How high would it rise? Of course, no one can know, but assuming governments choose the level to balance job losses against political expediency, one might guess that governments would raise the tax to a level where the job loss was more or less at its pre-coordination level. This would probably improve the welfare of European politicians but harm Europe's economy.

In Figure 1, this is a situation where coordination would move the outcome from *E4* to *E3* (higher taxes), but this would be harmful since the bliss point involves lower social charges, not higher ones. It follows that coordination on social charges is bad since it inhibits competition among governments that would prevent them from overtaxing their citizens due to political economy distortions.

2.2.2 Subsidiarity and task allocation among different government levels

We will now look at two other factors that might argue against coordinating (industrial) policies: one is the diversity across EU nations and the other is the informational advantage of national governments over a central EU authority.

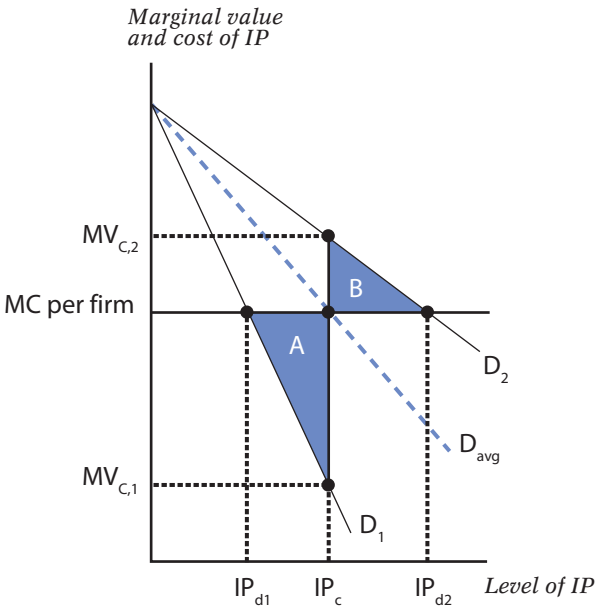
To start with diversity, productive conditions differ widely across the EU, and Member States' attitudes towards government intervention also vary a great deal. In these circumstances, centralisation or even strict coordination of industrial policy can result in a one-size-fits-all compromise that might be inferior for most or even all EU nations. Indeed, this is probably the main reason why most of Europe's industrial policies are set at the national or even regional level.

To illustrate this general idea more concretely, consider the two-nation model shown in Figure 4. The downward-sloped curves in the diagram show the marginal value per firm (*MV*) of implementing industrial policy; so they are something like demand curves for industrial policy. D_1 and D_2 show the marginal value curves for the two nations under study. The marginal value of industrial policy differs in the two nations, for example, perhaps country 1 has a well-functioning venture capital market that exploits many opportunities while country 2 has none, so the marginal value of industrial policy is systematically higher in country 2.

What levels of industrial policy would the two nations choose independently? If the marginal cost per firm (*MC*) of undertaking industrial policy is the same in the two nations (we assume this for simplicity), the government of country 1 would best serve its citizens by choosing IP_{d1} where the per-firm marginal value equals the per-firm marginal cost (*d* is a mnemonic for decentralised). The government of country 2 would choose a higher level of industrial policy, IP_{d2}. Contrast this with the situation of strict coordination in the sense of imposing the same level of industrial policy in both nations. The best one-size-fits-all policy is IP_c (*c* for coordinated), where the per-firm cost matches the average marginal value per firm (D_{avg}).

Plainly, the strictly coordinated outcome is inferior. Taking the decentralised choice as the initial situation, both regions are made worse off. Country 1 has too much industrial policy whereas country 2 has too little. The welfare loss of country 1 from coordination is reflected in the size of the triangle *A* (this measures the gap between the marginal value and the marginal cost integrated over the change in the level of policy). The loss of country 2 is shown by area *B*.

Figure 4. Diversity of preferences and decentralisation



Of course, it is possible for the central authority to choose separate industrial policies for the two nations, but then the best it can do is to reproduce the uncoordinated outcome. More important, however, the above discussion assumed that national governments and the central authority were perfectly well informed. In reality, neither is. But it is reasonable to assume that the cost of gathering information on national preferences for and costs of industrial policy is lower at the national than the EU level. It follows that even if coordination were successful in tailoring industrial policies to national conditions, formulating and implementing it would be more costly than uncoordinated national polices.

The general presumption is that coordinating industrial policy at the EU level is likely to be harmful or useless. Of course, strong spillovers can counter this presumption.

All in all, given the diversity across nations, the informational advantage that national governments have, and the difficulty of negotiating common policies in a group of nations as diverse as the EU, it is unlikely that the centralised policy choice would be as good as the decentralised one. We thus arrive at the general presumption that coordinating industrial policy at the EU level is likely to be harmful or useless. Of course, strong spillovers can counter this presumption. This takes us to cases where coordination could help.

2.3 Helpful coordination

2.3.1 Negative spillovers: beggar-thy-neighbour policies

Most international coordination of industrial policy in the EU and in the world more generally consists of what might be called mutual self-denial, that is, nations agree to prohibit beggar-thy-neighbour industrial policies. The EU's prohibition on most forms of direct state aid to industry is a classic example, along with the WTO's prohibition on export subsidies.

Consider an industrial policy that lowers the marginal costs of firms in a specific sector within a single nation. This policy will create negative pecuniary externalities for firms in other nations. In particular, the enhanced competitiveness of the favoured firms will depress the price of the good they produce in all markets – presuming the good is traded – and this will force un-favoured firms to accept both lower prices and lower sales. Of course, the welfare effects of this might be just the reverse – the nation pursuing this policy might end up losing as a whole and other nations might end up winning overall – but such policies are generally viewed as bad, and this for two distinct reasons. First, many governments act as if the interest of their industrial firms represented the interest of their nations. Second, even without this sort of political economy distortion, it is easy to argue that allowing such beggar-thy-neighbour policies would result in a non-cooperative outcome of the prisoner's dilemma type where all nations adopt expensive industrial policies merely to neutralise the effects of foreign industrial policy.

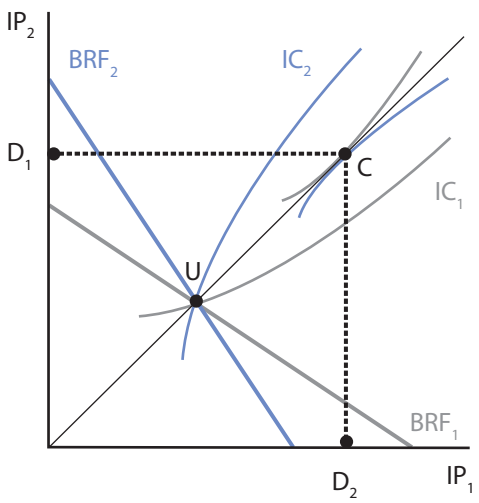
The Treaty of Rome prohibits an extremely wide range of such policies. These include not just proactive industrial policies that have direct effects on other Member States' markets, but also trade barriers that are meant to favour local firms in the local market. In terms of Figure 1, we have been considering industrial policies that are strategic complements, and agreement to refrain from such policies could be viewed as a move from *E1* to *E2*, with the bliss point being *B2*.

2.3.2 Positive spillovers: global public goods

A classic example of where coordination improves outcomes is the case of global public goods, such as the knowledge arising from research and development.

A classic example of where coordination improves outcomes is the case of global public goods. In the case of industrial policy, spending on research and development (R&D), especially on science and technology, has global public good aspects in the sense that one EU nation's spending bolsters the competitiveness of industrial firms in all EU nations. As R&D spending of one nation reduces other nations' incentive to spend on R&D too, we are thus considering industrial policies that are strategic substitutes in the parlance of Figure 1.

Figure 5. Coordinated *vs.* uncoordinated R&D spending



Consider the example of spending on basic research in the pharmaceutical industry. The knowledge created with the help of public money facilitates the development of new products in all of Europe's pharmaceutical companies, not just those in the nation paying for it. However, the cost of the funding falls solely on the paying nation. Figure 5 illustrates the situation.

The curve marked IC_1, shows the preferences of country 1 towards R&D spending by itself and country 2. The important part is that country 1 prefers every point above its *IC* since such points involve more spending by country 2 – which provides free spillovers for the firms of country 1 – for any given level of spending by country 1. The line marked BRF_1 (the best-reaction function) shows the best responses of country 1 for any given level of spending by country 2. The corresponding curves with the subscript '2' show the analogous constructs for country 2.

If the two nations set their R&D spending levels in an uncoordinated fashion, the outcome will be the point marked *U*; this is where country 1 is doing its best taken as given the spending of country 2 – and *vice versa*. In other words, the combination of R&D spending implied by point *U* is stable in the sense that neither nation would want to change its spending unilaterally.

Figure 5 illustrates the possible gains from coordinating nations' R&D spending: all points between the two *IC*-curves (northeast of *U*) are combinations of spending where both nations would be better off. Such points are called the region of mutual gain. How is it that nations would choose point *U* when both could be better off by choosing combinations of spending in the region of mutual gain? The logic explaining this is exactly akin to the logic behind the well-known prisoners' dilemma, and can be best described as a coordination failure.

Note that an outcome like *C* is unlikely to arise without some form of institutional commitment on the part of the two nations. If country 1 believed that country 2 would spend at the level implied by point *C*, the best unilateral move of country 1 would be to cut its spending to zero and free ride on the R&D spending of country 2. This is the deviation-from-coordination point D_1. Of course, as country 2 is symmetric, its best unilateral reaction to country 1 spending at point *C* would be to cut its spending down to zero (point D_2). This is where a supranational organisation like the EU comes into the picture. If EU nations can credibly commit to spending at point *C*, they will all be better off. For example, if nations simultaneously commit funds to the EU, the EU will spend it and all nations are better off. Note that without the EU, nations could probably succeed in some coordination involving a level of spending that is between *U* and *C*. The basic reason being that any 'cheating' by one nation could induces the other countries to revert to the uncooperative outcome. Thus, the losses each nation fears from the breakdown of coordination and the gains they enjoy when they coordinate provide the 'carrot and stick' necessary to maintain cooperation.

If all EU countries can credibly commit to spend a certain amount on global public goods, such as research and development, they will all be better off.

2.4 Other aspects shaping the pros and cons of coordinating industrial policy

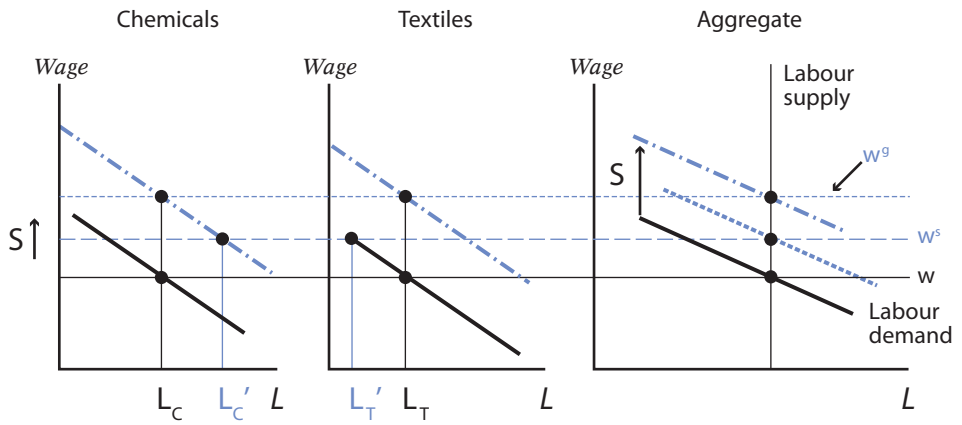
2.4.1 General *vs.* specific industrial policy

When it comes to prohibiting and thus coordinating industrial policies – especially subsidies – it is important to distinguish between general (or horizontal) and specific (or vertical) policies. Policies applied to all sectors are called general policies and those applied to only some sectors are called specific policies. General policies will lead to wage adjustments that fully, or at least largely, offset the initial competitiveness effects of such policies. As a result, there is a general presumption that general policies are less likely to be beggar-thy-neighbour policies.

To illustrate the point, consider a nation with two industries, chemicals and textiles, whose prices are fixed by international trade. In Figure 6, the solid lines show the labour demand curves for each industry in the two left-hand panels and the nation's aggregate labour demand in the right-hand panel. The right-hand panel also shows the nation's labour supply curve with a solid line. It is vertical since we suppose, for simplicity, that the supply of labour does not rise with an increase in wages. The equilibrium wage is *w* and employment in the two sectors is L_C and L_T.

Consider now the impact of a general wage subsidy, i.e., one that applies to both sectors. This lowers the marginal production costs and thus raises the value of the marginal productivity of workers by the amount of the subsidy *S*. In Figure 6, this leads to an upward shift in the labour demand curves (the dashed lines). In essence, this is because the general wage subsidy enables firms in both sectors to offer higher wages. What are the effects on equilibrium wages and employment? Since the aggregate supply of labour is fixed, the equilibrium wage in both sectors rises by the full amount of the subsidy, reaching w^g (*g* stands for 'general'), and aggregate and sectoral employment remains unchanged. In other words, a general equilibrium change in production costs (the wage hike) will exactly offset the general wage subsidy. In sum, in this simplified world, a general subsidy would have no impact on the nation's production pattern and thus would have no negative effects on industry in other nations. It follows that the issue of coordination does not arise.

Figure 6. General *vs.* specific industrial policy



If the wage subsidy, by contrast, is specific to one sector, the outcome is quite different. Suppose the chemicals sector gets the wage subsidy but the textile sector does not. In this case, the chemical industry's demand for labour corresponds to the dashed line. Like a general subsidy, the specific subsidy enables chemicals firms to offer higher wages for a given level of employment. By contrast, textile's labour demand curve remains unchanged and thus corresponds to the solid line. The aggregate labour demand curve is the dotted line shown in the right-hand panel; for obvious reasons, it lies between the solid line and the dashed line.

Sector-specific industrial policy is coordinated in the EU in the sense that it is generally forbidden.

What are the effects on equilibrium wages, aggregate employment, and employment in each sector? The nation's wage would rise somewhat, to w^s (*s* stands for 'specific'). With labour mobility across sectors, the nation's textile sector becomes less competitive as there is no subsidy to offset the increase in nation-wide wages. But with an increase in equilibrium wages, textiles' labour demand shrinks along the solid demand curve and employment in the textile sector drops to L'_T. By contrast, the competitiveness of the chemicals sector rises because the wage hike does not fully offset the subsidy paid to firms in the chemicals sector. Employment and output of chemicals rises, with employment reaching L'_C. The nation's trade partners would complain that this specific policy gave the nation's chemicals producers an unfair advantage. For this reason, this sort of sector-specific industrial policy is coordinated in the EU in the sense that it is generally forbidden.

Some caveats and complications are worth mentioning. The diagram used above yields the unambiguous result that general policies do not distort competition. The real world, as always, is much more complex and most of these complexities suggest that even general policies can have distortionary effects (for instance, if the labour supply curve slopes upward). All in all, in a more

realistic model, even general policies can distort competition, but the size of the distortion is likely to be small as long as policies are indeed 'general'.

We have mentioned above that the Treaty of Rome prohibits an extremely wide range of policies that have direct effects on other EU members' markets or aim at favouring local firms in the local market. But such coordination stretches beyond the EU, an issue we sketch next.

2.4.2 WTO obligations

EU nations are members of the World Trade Organization (WTO) and signatories to the General Agreements on Tariffs and Trade (GATT). Under the WTO/GATT (WTO from here on), nations are not allowed to provide subsidies and engage in policies that distort international trade. But since trade is just the difference between national production and national consumption, and the whole point of industrial policy is to foster industrial production, any discussion of industrial policy must be informed of WTO strictures.

EU nations are members of the World Trade Organization (WTO) and, thus, any EU industrial policy must be informed of WTO strictures.

WTO rules discipline the use of subsidies, and regulate the actions nations can take to counter the effects of subsidies. According to the WTO, a policy is a subsidy when it involves a financial contribution, when this financial contribution comes from a government, and when the policy provides a benefit to the receiving firms. A key concept here – a concept that is also very much a part of the EU's rules on subsidies – is the concept of a 'specific' subsidy. This is a subsidy obtainable only by an enterprise, industry, group of enterprises, or group of industries in a particular nation. General subsidies – investment tax credits, for instance – are not subject to WTO discipline since there is a presumption that general equilibrium price adjustments will offset the policy's impact on trade. A further distinction must be made between production and export subsidies.

According to the WTO, subsidies fall into two bins, 'prohibited' and 'actionable'. Prohibited subsidies are designed to distort international trade, either by promoting exporters, or by promoting local goods at the expense of imported goods. It is important to note that a strict interpretation of WTO rules suggests that almost all forms of industrial policy of the EU and its member would be prohibited or actionable.

2.4.3 Competition policy as industrial policy

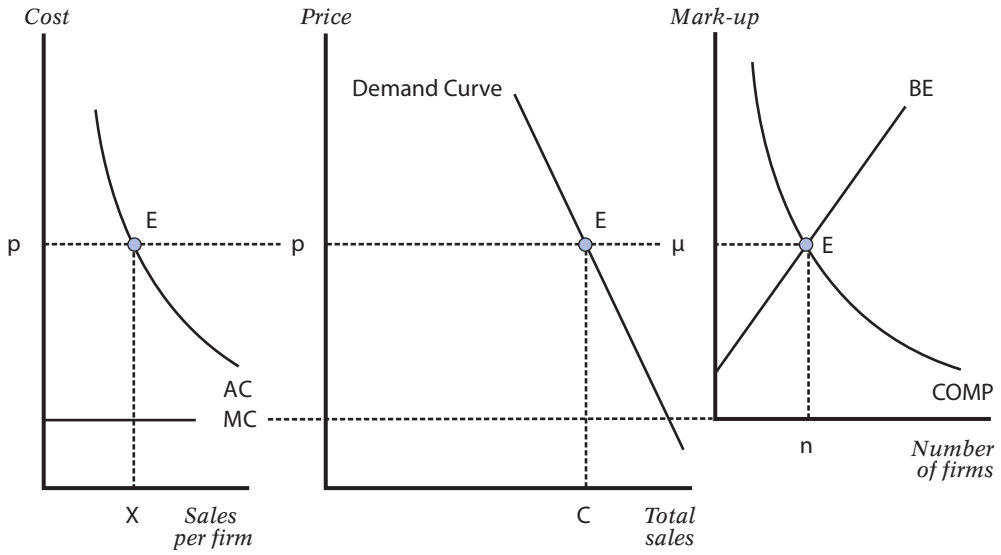
Policy makers tend to view preserving industrial firms by shielding them against competition as an obvious way of promoting industrial production. Although this might be well-intended, it can be a self-defeating policy. What is more, promoting competition can be considered a welfare-enhancing industrial policy. This sub-section sets out why.

The gist of the argument is as follows. Protecting firms against competition results in too many, too small firms that must charge high prices to compensate for their inability to reap scale economies. High prices result in lower demand and production and, thus, protecting existing firms can result in lower industrial production. One clear real-world example was seen in telecom services. Before liberalisation, each European nation had its own monopoly provider, services were expensive since firms were small and, as a result, consumers did not spend much on telecoms. With the liberalisation of telecoms, competition has forced a massive industrial restructuring, increase in the size of firms, and reduction in the price of services. The result has been a boom in the amount of telecom services produced and consumed in Europe.

Working through the logic of this argument, however, is tricky. The task is eased by using a diagram in which the number of firms (assumed to be identical for simplicity), firms' mark-up of prices over

marginal cost, the scale of firms, and aggregate production are determined. The diagram, shown in Figure 7, draws on Baldwin and Wyplosz (2004).

Figure 7. Prices, output, firm size, and number of firms in a closed economy



Source: Baldwin and Wyplosz (2004)

The diagram has three panels. The middle panel is the simplest so that is where we start. It shows the demand curve facing the sector. To keep things simple, we assume that Europe is closed so that total consumption equals total production. In this way, the middle panel tells us what total production will be, once the price is determined.

The left panel shows the average and marginal cost curves for a typical firm in an industry characterised by economies of scale. We assume that the number of firms adjusts to eliminate pure profits, so in equilibrium a firm's scale of production must be such that its average cost equals the price it receives.

The right panel is the most intricate of the three. On its vertical axis, this panel has the mark-up, i.e., the difference between price and marginal cost. On its horizontal axis, it measures the number of identical firms. The COMP curve shows the equilibrium combination of mark-up and number of firms assuming Cournot competition. Plainly, COMP slopes downward since more competitors push down the mark-up that each firm can charge. The BE curve shows for alternative mark-ups the number of identical firms that break even at this mark-up, with break even meaning that price equals average cost. The BE curve slopes upward because as the number of firms rises, sales per firm fall, average costs of the typical firm goes up and, thus, firms would need a higher mark-up in order to cover their fixed costs.

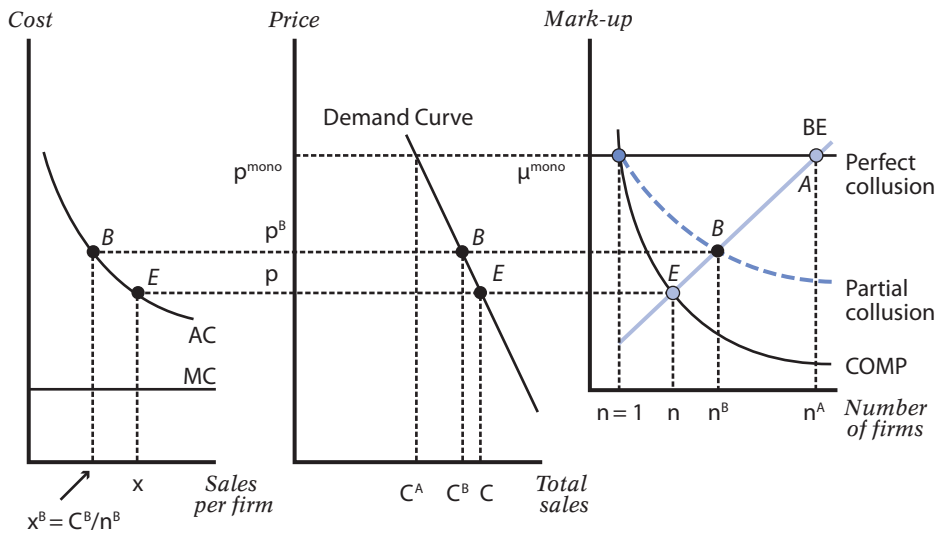
The equilibrium *E* in the three panels identifies the equilibrium number of firms (*n*), mark-up (μ), price (*p*), firm size (*x*), and total output/consumption (*C*).

We can use the BE-COMP diagram to explain how competition policy can promote industrial production and why competition policy can be considered an industrial policy. To make the point, let us recall that the COMP curve in Figure 7 assumed Cournot competition, that is, firms do not

collude. We turn now to considering the possibility that firms collude. To fix ideas, we first consider extreme collusion, i.e., perfect collusion in which a cartel of all firms manages to maintain the monopoly price and share out production among all firms.

If all firms could perfectly coordinate their sales, they would charge the monopoly price and divide up the market. This type of behaviour is illustrated in the BE-COMP diagram with the 'perfect collusion' line shown in Figure 8. This line extends horizontally since it assumes that the market always equals μ^{mono} regardless of the number of firms. Note that the monopoly mark-up is given by the point on the COMP curve where $n=1$. The equilibrium number of firms under perfect collusion – i.e., the maximum number of firms that could break even under perfect collusion – is given by point *A*. The level of industrial production under perfect collusion is shown by point C^A.

Figure 8. Industrial restructuring induced by competition policy



Source: Baldwin and Wyplosz (2004)

Starting from this situation, consider the impact of an EU-wide competition policy that breaks up the cartel. If the competition policy were completely effective, the situation would move to *E*. The result would be a severe drop in the number of firms, but since the mark-up and price fall, the sector's total output rises to *C*. Firms are able to break even in this more competitive, lower price environment since the industrial restructuring has resulted in fewer, bigger firms with lower average costs.

Competition policy in an industry characterised by scale economies results in lower prices and costs, higher output, and a smaller number of more efficient firms.

If competition policy is imperfect and some collusion prevails, we would get an intermediate outcome: industrial output would be larger (smaller) and the number of break-even firms smaller (larger) than in a situation of perfect collusion (competition policy). In Figure 8, this outcome is labelled as 'partial collusion' and the associated equilibrium is denoted with *B*.

Where does policy coordination come into the picture? Consider the implementation of a perfect competition policy starting from point *A* in Figure 8. We know that the number of firms will fall from n^A to *n*, but which nation's firms will survive?

To be concrete, suppose the EU consists of only two nations, each with an equal number of firms to start with. If there are some natural trade barriers between the two markets (this means stepping slightly out of the assumption behind the diagram), and one nation pursues a less aggressive,

or delayed competition policy than the other nation, there will be a tendency for fewer firms to exit in the nation that pursues a laxer policy. In the end, the overall number of firms will fall to something like *n*, but the share of industrial production in the nation with the lax policy will be greater, potentially much greater. It is possible that something like this is going on in the electricity and water markets in Europe.

EU-wide competition rules are important in preventing beggar-thy-neighbour competition policy.

The problem with this uncoordinated response is that fear of such an outcome might make both nations hesitate to committing to a competition policy that would be in both their interests. In this sense, EU-wide competition policy is important in so far as it lets members believe that market forces rather than devious national policies will lead industrial restructuring. Without such assurances, it is unlikely that EU members would allow deeper market integration to go ahead. Or, to put it differently, EU-wide competition rules are not so important in what they can achieve compared to what national competition policies could, they are important in what they prevent – beggar-thy-neighbour competition policy.

It is worthwhile to finish with a brief analysis of the welfare implications of an EU-wide policy that succeeds in fostering competition. To this end, we look at the welfare changes resulting from industrial restructuring that proceeds from perfect collusion via partial collusion to Cournot competition. In Figure 8, this is the move along the BE curve from *A* to *B* and finally *E*. Note first that in our simplified model firms' profits do not change: while the number of firms falls as the industry approaches *E*, those firms operating in the market just break even – there are no excess profits. In a sense, firms share the fate of the hero in the movie 'Life of Brian' – they start with nothing and they end up with nothing. This implies that it is the change in consumer surplus that determines the impact on society's welfare. In this respect, the message transpiring from the middle panel of Figure 8 is clearly positive: with a decline in prices and an increase in consumption, the consumer surplus – measured by the usual area under the demand curve – continuously increases. While measured in the middle panel of Figure 8, the source of this welfare gain is shown in the left-hand panel, namely the realisation of scale economies and the associated decline in average production costs. To conclude, while our simple framework inevitably abstracts from real-life complications – for instance that industrial restructuring is not without frictions but comes with adjustment cost – it seems fair to conclude that, ultimately, competition policy as an industrial policy has lot to offer to EU nations.

3. Delegation *vs.* coordination

So far, we have viewed coordination in an institutional vacuum – the issue was whether EU nations should coordinate their policies or whether each nation should set its own policy. One of the key insights emerging from this discussion is that coordination makes sense in some cases but not in others. What is more, the merits of coordination might vary over time for a particular issue. In practice, most coordination – notably of industrial policies – is done by getting nations to agree on policies. There are cases, however, where the cost of policy coordination is so high that nations delegate the policy to a supranational body.

To set the scene, let us look at a clear-cut case for delegation of a non-industrial policy, that is, monetary policy in the eurozone. Before the euro was introduced, national central banks in Europe coordinated their policies. They did so since coordination was viewed as providing economic benefits that outweighed the costs of adopting a one-size-fits-all monetary policy. However, as the exchange rate crises of the 1990s showed, the cost of coordination without delegation can sometimes be quite high. The ultimate response was to delegate monetary policy to the EU level.

This, in essence, was more a change in the decision-making procedure than a change in the policies adopted. In the run up to adopting the euro, EU central banks were following almost identical monetary policies (as gauged by interest rates). When the euro was introduced, the main change was in how the common policy was decided. Before EMU, each central bank governor decided on the nation's monetary policy in coordination with other central bank governors. In EMU, governors are deciding – together with the executive board of the European Central Bank – while sitting in the same room.

Another example for delegation rather than coordination is EU trade policy, with the Common External Tariff not set at the national but the EU level. Here again, one could in theory at least think of coordination of different national trade policies. However, coordination in this case would be rather difficult and cumbersome, especially if it allowed for differences in external trade policies to exist among EU members. A common trade policy with, in particular, a single external tariff, is also a way to help trade integration among EU countries (by avoiding the problems of the rules of origins for example). Hence, delegation makes sense as it has been decided *ex ante* that trade policies of member countries should be identical.

There are EU policies where delegation coexists with coordination.

And then there are EU policies where there is delegation alongside coordination. For example, EU members have decided to coordinate some aspects of their regional policies in the form of the 'structural funds'. The level of spending for the EU and its allocation among members is decided at the EU level. But the choice of individual projects is decided in national capitals, although these choices are guided by general guidelines and objectives set at the EU level. This example also nicely illustrates the key difference between coordination and delegation. When the EU decides in the context of its Financial Perspective (the EU's seven-year budget) on the size and allocation of structural funds, the decision-making rule is unanimity and agreement is difficult. But since it is absolutely essential that all members agree on the amount of funds and its allocation, the decision must be delegated to the EU level. The choice of individual projects in each nation could also benefit from coordination at the EU level, but getting unanimous decision on these projects would be so difficult and time consuming that the cost of deeper coordination would outweigh its gains.

When it comes to industrial policy, the relevant example is surely that of structural funds. There are merits from coordinating industrial policy at the EU in a general manner, for instance with a view to avoiding beggar-thy-neighbour industrial policies. But the choice of individual projects involves local knowledge and local spillovers, so fusing the national decision-making into a single EU body is likely to yield greater decision-making costs without substantially improving policy choices.

4. Coordination and the localness of industrial policy spillovers

4.1 Defining localness

The main conclusion emerging from of the previous sections is that coordination should be the exception rather than the rule. Given the endemic problem of information asymmetries and the disciplining effect of jurisdictional competition on special interest groups, it is probably a good idea to presume that policies should not be coordinated unless a strong case can be made in favour of coordination. If nothing else, the time and energy needed to coordinate detailed industrial policies among nations as diverse as the 25 EU members should be enough to suggest that decentralised policies should be the general presumption.

Having said this, it is important to analyse in greater detail the scope of spillovers associated with national industrial policies. This will provide a better understanding of when coordination does not make sense and when it does. What is more, it will provide a framework for thinking about which types of policies would be good candidates for coordination.

Industrial policy spillovers can be local in the sense of only affecting firms in a well-confined geographical area or narrow sectors.

A key principle guiding this analysis is that spillovers and industrial policies can be local in two senses of the word. For one thing, they can be local in the standard spatial sense, i.e., they only affect firms in a well-confined geographical area, a city, a region, or a nation – for instance. For another, they can be local in the sense of only affecting narrow sectors. Using this distinction, we examine, first, spillovers and industrial policies that affect output markets and, second, those that are relevant for factor inputs.

4.2 Industrial policy spillovers and the localness of outputs

Because most manufactured goods are easily traded, few pro-manufacturing policies have purely local effects. There is, nonetheless, a range of localness. When it comes to negative spillovers – the most common one being 'unfair competition' effects propagating through goods markets – there is a close link between the cost of trading the good and the extent of spatial localness of the policy's effect. But quite independent from the spatial reach of spillovers and industrial policies, spillovers and policies might affect only a narrow range of firms, or a narrow sector. Combining spatial and sectoral dimension, we can think of five distinct cases, as illustrated in Figure 9.

Case A: no spatial and sectoral spillovers. Consider a policy that has only very local effects in both the spatial and the sectoral dimension. A direct subsidy to a gravel quarry in France's *Haute Savoie*, for example, would promote industrial output. The spillovers of this policy, however, would be limited. Gravel is relatively expensive to transport over long distances, so the subsidy is unlikely to have negative effects on other regions and nations. As to the sectoral impact of such a subsidy, gravel is highly local since it is not used as an input in many other sectors. Moreover, gravel tends to be an input only in non-traded goods, such as roads.

Under WTO rules, a subsidy to a particular gravel pit is actionable, and under EU rules it is probably prohibited. But since no one is likely to complain about it, it is not a good candidate for coordination. Indeed, given the general lack of positive or negative spillovers it is probably best to leave such policies to the discretion of EU member states.

Case B: positive spatial spillovers but no sectoral spillovers. One example is a subsidy to foster drug-development technologies in the pharmaceutical sector. The effect is local in the sectoral sense since it only helps pharmaceutical firms develop drugs, but it helps such firms in all nations (even if it is under patent). This is a classic example of the sort of vertical industrial policy that would benefit from coordination to mitigate free-rider behaviour. Moreover, even if this policy would be actionable since it is specific, it is unlikely to be challenged since it benefits firms around the world.

Case C: negative spatial and narrow sectoral spillovers. In this category, we find most of the commonly prohibited industrial polices. A classic example is a nation-specific production subsidy or tax-break in a traded goods sector. For example, if one EU nation were to subsidise the production of cars, carmakers in the rest of the EU – and indeed in the world – would be harmed as they would sell fewer cars at a lower price than they would without the subsidy. EU and WTO rules forbid such

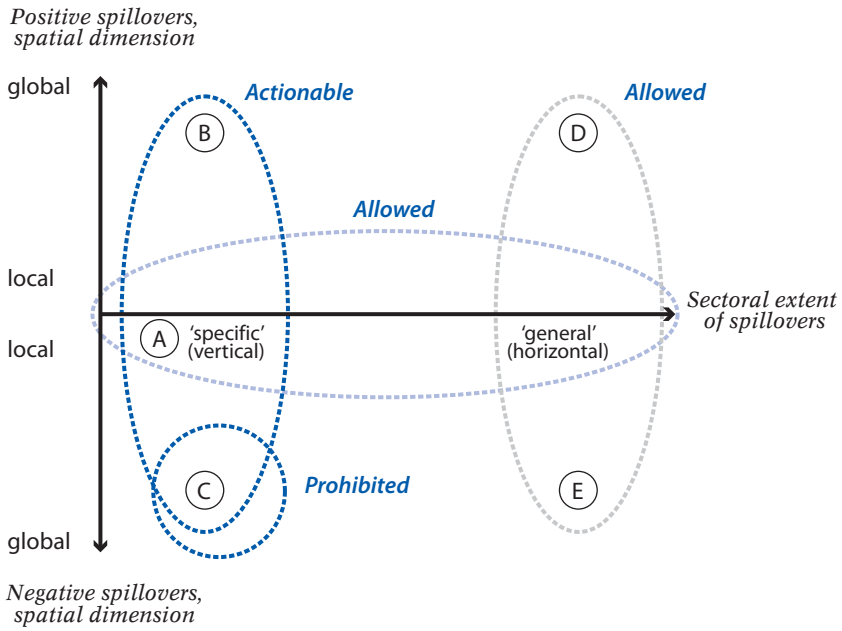
subsidies, and the injured firms are sure to complain. In this case, industrial policy is coordinated but in the sense of a coordinated prohibition of the industrial policy.

Case D: positive spatial and sectoral spillovers. An example of a policy with positive effects across spatial locations and sectors is an educational system that produces a few world-class scientists and engineers, France's *École Polytechnique* for instance. The graduates of such schools tend to work in industry and laboratories producing new knowledge that is useful in a variety of industrial activities. However, not all of them work in France and even those who do often produce knowledge that promotes industry worldwide. Again, the free-rider problem suggests that too little of such training is done, so coordination could well be welfare enhancing.

Case E: negative spatial and sectoral spillovers. This is the mirror image of the previous case. In the enlarged EU, it is often asserted that low social charges and corporate taxes in new EU members harm the industrial competitiveness of 'old' members. As the analysis in Figure 3 showed, there is some truth to this, in which case this sort of 'system competition' might well constitute an industrial-policy example in region *E* of Figure 9. For such policies, coordination has, in principle, the potential to make all nations better off. In practice, however, there is a genuine risk that political expediency leads governments to coordinate on too high a level of social charges and taxes, thereby equalising industrial competitiveness across EU nations at the price of undermining Europe's competitiveness as a whole.

Coordinating social charges and corporate taxes of EU members is liable to lead to a level of social charges and taxes that would undermine Europe's competitiveness as a whole.

Figure 9. Two dimensions of localness of industrial policy spillovers



To conclude the discussion of the localness of industrial policy spillovers on output markets, we have seen that specific industrial policies often create negative pecuniary externalities that lead nations to coordinate on their prohibition. This has shifted the focus to general, i.e., horizontal policies. Some of these policies affect output directly. For example most nations provide some sort of tax credit or accelerated depreciation allowance for capital investments. Much of industrial policy, however, concerns inputs, so it is worth thinking through the basic logic of how the promotion of certain types of inputs can affect a nation's industrial base. This takes us to industrial policy spillovers and the localness of inputs.

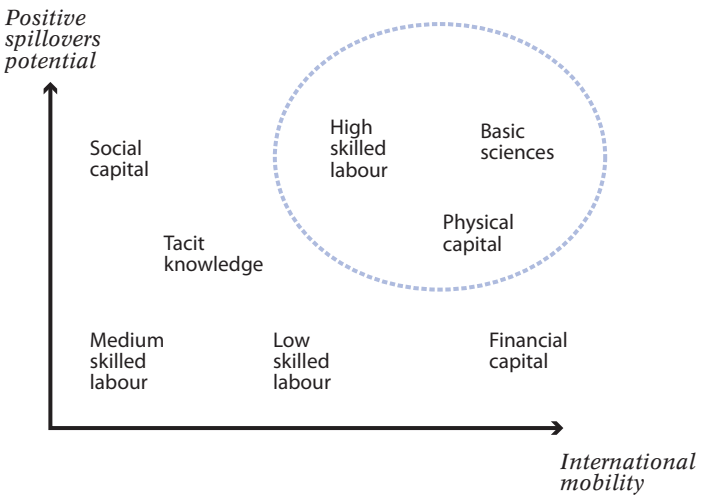
4.3 Industrial policy spillovers and the localness of inputs

In analysing input-oriented industrial policies, it is useful to consider input factors along two dimensions: their mobility and their spill-over potential.

Two questions will be of concern here: first, what are the chances of an input-oriented industrial policy to succeed in promoting industrial production and employment in the jurisdiction of the government implementing it and, second, to what extent should such policies be coordinated among nations? In answering these questions, an important consideration concerns the mobility of the inputs promoted by the policy and policy spillovers. We thus consider factors of production in two dimensions – their mobility and their spill-over potential.

Figure 10 presents a schematic depiction of the features of seven productive factors: three types of labour, two types of knowledge, and three types of capital. The main purpose of this diagram is to help organise thinking about the effects of various input-promoting industrial policies.

Figure 10. Mobility and spill-over potential of inputs



The idea of this diagram is to suggest that one way to think about desirable types of industrial policy and the need to coordinate them is to consider their combination of mobility and spillovers. At one extreme, an industrial policy that promoted a nation's financial capital would have little local effect on industrial production. The point is that the newly created capital would flow to the nation where its reward would be highest. As a result, much – maybe even most – of the effect of this industrial policy would be to boost industrial production in other nations. Since the promoting nation has to pay for the policy but gets little of the benefit, this sort of scheme will be unpopular with individual nations. But of course this is also a reason to coordinate if it turns out that financial capital is crucial to industrial output, a proposition that we doubt.

Contrast this with the impact of promoting basic scientific and technological knowledge. Such knowledge is easily transported around the world and so it is highly mobile. However, the benefits of employing it are not localised; this sort of knowledge often creates important positive spillovers for industry in other nations. We could think, for instance, of new intermediate products that facilitate the introduction of new products and, more generally, new products and processes across the world. Advances in material sciences are an example of this. Hence, public spending on R&D is a natural candidate for coordination as illustrated by Figure 5. The possible mutual gain from coordination, measured by the distance between the two indifference curves, would be large.

Moving down the mobility scale, physical capital is internationally less mobile than both financial capital and basic scientific knowledge, especially after it is sunk, and it has intermediate spillovers. High-skilled labour is next, but it combines comparatively low international mobility with a reasonably high degree of spillovers. This combination is one of the reasons why almost all governments believe that subsidising technical and business education is one of the best ways to promote their nation's industrial competitiveness. Although highly educated workers do switch nations, they are far more attached to the nation who paid for their education than, for instance, financial capital. Hence, in terms of gains from coordination (in terms of Figure 5, the distance between the two indifference curves), education for high-skilled labour would certainly range between basic science and promotion of financial or physical capital.

Tacit knowledge is the next in the schematic diagram. Tacit knowledge is a slippery concept, but this is on purpose. It is meant to represent the knowledge that seems to encourage spatial clustering of production – in Silicon Valley and Northern Italy, for instance. This knowledge is difficult to promote directly, but it has the great advantage of being unlikely to leave the nation once it has been created. This unique combination explains why so many nations are trying to create industrial clusters, or hubs. The gains from coordination are therefore certainly quite low except for possible transnational clusters.

The position of medium-skilled and low-skilled labour requires little comment. Low-skilled workers are relatively mobile in today's Europe, at least relative to medium-skilled workers (craftsmen, mechanics, and so on). Neither medium-skilled nor low-skilled labour generates much spillovers in the sense of there being large differences between the social and private returns to these types of labour.

Finally, each nation, and indeed each location in each nation, has 'social capital' and this affects the appeal of the location for workers and firms alike. What is social capital? A great deal of human interaction, not only in the sphere of economics, depends upon factors like trust and reliability. Clearly, the extent to which societies are marked by these intangible factors varies enormously. If a citizen forgets his wallet at a bar in a small village in the north of Sweden, she is almost certain to get it back within hours. If the same happened in the centre of Rome, the outcome could be, but need not be, as happy. Since economic interactions require trust, too, a sense of social justice and trust can be an important magnet for economic activity. In essence, good social capital lowers transaction costs and thus fosters economic activity. On the spillovers scale, social capital is very localised, but it provides benefits across most sectors. The gains from coordination would certainly be very low.

All told, high international factor mobility makes it difficult for individual nations to fully appropriate the positive effects of policies that promote mobile inputs. This undermines nations' efforts to raise the quantity and quality of such inputs. What makes the situation worse is that each nation thinks it could free ride on the efforts of other nations. It follows that coordinating policies in support of factor inputs is most important when international factor mobility and spillovers are large, such as in the case of basic science, high-skilled labour, and physical capital.

Coordinating policies in support of factor inputs is most important when international factor mobility and spillovers are large.

5. Conclusions and policy implications

Industrial policy is something all nations do. Since the effects of one nation's industrial policies are not entirely limited by its borders, the effects of industrial policies overlap. In principle, this

suggests that coordinating industrial policies at the EU level might be a good idea. But would it be a good idea in practice?

While it is in general not possible to say whether industrial policy coordination is good or bad, the EU has no need to set up a new structure for coordinating industrial policy.

The spillovers from national industrial policies can cause helpful or harmful competition among policy makers and helpful or harmful interactions among the targeted industries. It is not in general possible to say whether industrial policy coordination is good or bad. Note that this ambiguity is not a universal feature of all policy. For example, the case for coordinating external trade policy in a customs union like the EU is ironclad. Nothing but harm could come from allowing each EU nation to decide its own external trade policy.

While the benefits of industrial policy coordination are not easy to pin down in general (although they can be quite obvious for certain cases such as Galileo), we can be quite sure that reaching agreement at the EU level on any type of policy – trade policy, monetary policy, or industrial policy – would be a very costly exercise in terms of time and political goodwill.

The contrast between the vagueness of the benefits of coordination and the surety of the decision-making costs leads to some clear policy conclusions. First, there will be instances of industrial policy in which European-wide coordination will yield large benefits. In these cases, the benefits of teaming up will outweigh the costs of agreeing to and adopting a unified policy. Second, in most cases of industrial policy, the cost of coordination – both economic and political – will outweigh the benefits. Third, the combination of the first two points suggests that the EU has no need to set up a new structure for coordinating industrial policy. In the few cases where the merits of coordination are obvious, they will be obvious to all and *ad hoc* cooperation will work.

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