THE REGIONAL COORDINATION OF INDUSTRIAL POLICY:

A New Framework for Coordinative Optimisation

Baptiste Albertone

Policy Lead of the Industrial Policy Programme, TIDE Centre, University of Oxford

Amir Lebdioui

Director, TIDE Centre, University of Oxford; Member of the Advisory Council of the African Continental Free Trade Area (AfCFTA)

TECHNOLOGY, INDUSTRIALISATION AND DEVELOPMENT (TIDE) CENTRE

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ABSTRACT

At a time when late-industrialisation opportunities are compressed, how can industrial policy be reconceived at the regional - rather than national-level? For developing nations that lack the domestic market scale to deploy demand-led industrial policy, unilateral strategies risk costly duplication, and a race to the bottom on social and environmental standards. Drawing on global lessons from ASEAN's flexible institutionalism, Airbus' negotiated division of labour, and the limits of EU-style cooperative maximalism, the paper reviews the merits and limitations of different regional industrial policy models within a three-level typology of minilateral, plurilateral, and supranational coordination.

Drawing on complex systems theory and game theory, we then introduce a new model of coordinative optimisation for industrial policy whereby optimal regional coordination is achieved through a coordinating body that functions not as a supranational authority but as an information broker: collecting feasible best responses from sovereign participants, aggregating distributed preferences, and returning coherent specialisation analyses that minimise total system duplication and address regional supply chain shortfalls to enable participants to adjust their strategy for optimal gains.

The model rests on three interlocking mechanisms. First, a principle of triple flexibility (compositional, longitudinal, and directional) allows the framework to accommodate political diversity, government turnover, and rapidly shifting technological and market conditions without disrupting ongoing collaboration. Second, the folk theorem logic of repeated interaction is embedded in the institutional design to enable iterative rounds of information revelation and preference adjustment towards building the trust necessary for sustained cooperation. Third, learning from historical failures, this model serves to protect national sovereignty within a cooperative regional space for industrial policy, thereby addressing a major political barrier in previous attempts at regional integration. By doing so, our model challenges traditional integration theory.

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TABLE OF CONTENT

1. Introduction: When Windows of Opportunity are Too High to Reach (Alone)

The normative rehabilitation of industrial policy is, in many respects, salutary. The accumulation of evidence on the limits of market-led development, and the visible success of state-directed industrial strategies in East Asia and, more recently, in China's green technology sectors, has made the intellectual case for strategic intervention difficult to ignore.

However, the return of industrial policy in the Global North and exceptionally large nations is not, for most developing nations, a rising tide. Neo-mercantilist impulses, green protectionism, and carbon border adjustment mechanisms are compressing the development space available to latecomers at precisely the moment when climate imperatives and digital transitions are creating new windows of opportunity (Lebdioui, 2024). For smaller developing economies, the choice between standing still and acting alone is, in both cases, a recipe for continued structural marginalisation. A key question is therefore to what extent it requires a move from national to regional thinking?

The problem of the limits of the national scale is an old question in development debates (see Kuznets, 1960) but remains an unresolved one. Even in the case of recent 'green' industrial policy both in the global North and in the global south, the recent experiences seem confined to large countries (e.g., China, Brazil, India), that were able to leverage internal demand (for instance by relying on demand-side policies to generate economies of scale while imposing local content requirements) (see Meckling 2021; Lema and Ruby, 2007; Pegels, 2014; Allan, forthcoming;).[1] Countries with smaller domestic market sizes face different constraints, and therefore replicating demand-led growth or the policy tools that work somewhere else might not be advisable.

For latecomer economies, the problem is not the absence of windows of opportunity. Critical mineral endowments, renewable energy potential, young and growing labour forces, and improving infrastructure all represent genuine productive assets. But when several neighbouring countries simultaneously pursue similar industrial strategies in isolation, each responding rationally to its own incentives, the collective result is likely to be costly duplication of investment in which individually sensible decisions lead to a fallacy of composition, destructive

[1] In countries with a small domestic market, local content requirements rarely work on their own, and their poor implementation can reduce the attractiveness of investments in renewables, or even worse, they can increase the levelized cost of energy (LCOE), thereby reducing the cost competitiveness of downstream industries.

competition for the same pools of foreign capital, a race to the bottom on labour and environmental standards, which altogether produce collectively suboptimal outcomes. This tends to reproduce a classic prisoners' dilemma. Countries forfeit the gains that would flow from pooling their resources, coordinating their specialisations, and presenting integrated supply chains to international investors, because no institutional mechanism exists to make the gains from coordination visible and credible.

This is, at its core, a coordination problem, and the appropriate analytical response is to ask what kinds of institutions can solve it. Industrial policy is fundamentally a question of coordination, the coordination of policies, the coordination of institutions, and the coordination of complementary or competing investments (Chang, 2002, 2011; Chang & Andreoni, 2020; Johnson, 1982; Rodrik, 2004). How, however, to make sense of the question of coordination when thinking about industrial policy at the regional level? This question has often been overlooked in the green transitions and industrial policy literature, which has focused on national conditions/dynamics/processes. While recent efforts are starting to address the global dimensions of industrial policy and its tensions (see Stiglitz forthcoming; Abdenur et al. 2025), the dominant tradition in development thinking has addressed the question of industrialisation at the national scale, treating the state as the relevant unit of agency and domestic policy instruments as the relevant levers.

Where regional dimensions have been considered, the discussion has tended to default to the logic of trade integration: the creation of free trade areas and common markets that remove barriers to the flow of goods, services, and capital across borders (see section 2). This approach, as we will document, has delivered consistently disappointing results in developing regions. Intra-regional trade in Latin America, Sub-Saharan Africa, and much of South and Southeast Asia remains remarkably low, not primarily because tariff barriers are too high but because productive structures across these regions are too similar and insufficiently industrialised to generate the complementarities from which trade-led integration could emerge (Davies 1996; Morales Fajardo, 2007; Ismail, 2018; Eder 2021).

Against this backdrop, this paper argues that what is required is perhaps not trade integration as the leading instrument of regional cooperation, but industrial policy coordination, in line with the emerging literature on developmental regionalism. Trade integration proceeds by removing obstacles to existing exchange, while industrial policy coordination proceeds by actively constructing new productive complementarities, allocating investments across national boundaries, and building the supply chain linkages that make regional integration economically meaningful rather than merely legally enacted (Davies, 1996;

Lebdioui, 2022). This is a harder institutional task, and it cannot be accomplished by replicating at the regional level the supranational ambitions that have characterised the European Union's model of integration, which presupposes levels of political trust, institutional capacity, and economic interdependence that most developing regions do not possess (Eder, 2021).

The paper proposes a different institutional logic, one that we term *coordinative optimisation*. Drawing on complex systems theory and the game-theory concept of the price of anarchy, we formalise the developmental cost of non-coordination as the gap between the aggregate value of nationally self-interested industrial strategies and the value that would be achievable through optimal regional coordination. We argue that this gap can be substantially closed through a coordinating body that functions not as a supranational authority but as an information broker: one that collects feasible best responses from sovereign participants, aggregates distributed preferences and capabilities, and returns coherent specialisation analyses that minimise total system cost, reduce duplication, and identify regional supply chain shortfalls that no individual country can address alone.

This model rests on three interlocking mechanisms. The first embeds the folk theorem logic of repeated interaction into the institutional design, ensuring that iterative rounds of information revelation and preference adjustment progressively build the mutual knowledge and trust necessary for sustained cooperation. The second introduces a principle of triple flexibility, distinguishing between compositional flexibility (which countries participate in which initiatives), longitudinal flexibility (how commitments can be adjusted over time as governments change and priorities shift), and directional flexibility (how the coordination agenda can evolve alongside technological change and shifting market conditions). The third mechanism draws on the historical lesson of the Airbus consortium to show that a negotiated division of labour, in which each participant can see and verify that they are capturing tangible benefits from cooperation, is a more durable foundation for regional industrial coordination than either a supranational authority imposing solutions from above or a purely voluntary platform that leaves coordination to emerge organically from unguided dialogue.

The paper proceeds as follows. The first section traces the intellectual history of thinking about industrial policy beyond the national scale, from Kuznets's early reflections on the limits of small economies through the Latin American structuralists' diagnosis of the constraints on import substitution industrialisation, to the more recent literature on developmental regionalism and the game-theoretic analysis of cooperation failures. The second section reviews three historical models of regional industrial coordination, the supranational model exemplified by the

European Union, the flexible intergovernmental model exemplified by ASEAN, and the minilateral negotiated model exemplified by Airbus, and develops a three-level typology of coordination arrangements, each with a distinct profile of potential gains and political costs. The third section introduces the model of coordinative optimisation, formalising the price of non-coordination, specifying the institutional design of the coordinating body, and elaborating the principle of triple flexibility. A brief conclusion draws out the broader theoretical and policy implications.

Two clarifications of scope are in order before proceeding. First, although the argument has relevance for many developing regions, the illustrative material draws particularly on Latin America, the Caribbean, and Africa, regions where the combination of rich resource endowments, fragmented productive structures, and overlapping but ineffective regional institutions make the coordination problem both acute and tractable. Second, the paper makes no claim that regional coordination is a substitute for national industrial policy or for engagement with the multilateral trade and investment regime. It argues, more modestly but we believe more usefully, that regional coordination is a necessary complement to both: a mechanism that can amplify the impact of national strategies, reduce their costs, and help developing regions engage with global green value chains on terms that generate durable rather than precarious developmental gains.

2. What Do We Know About Industrial Policy Beyond the National Scale?

The problem of the limits of the national scale is not novel to development thinking. Back in 1960, Simon Kuznets was already reflecting on the challenge of 'Economic Growth Of Small Nations', and of industrialisation more specifically, noting that 'the economic structure of small nations is typically less diversified than that of larger units' and 'that some of the full variety of industries observed in the larger nations is either lacking or only barely represented in many small nations' (Kuznets, 1960, p. 15).[2] So, what options exist for developing nations looking to industrialise through export led-growth? Historically, two main approaches can be differentiated: one that could be described as "market piggybacking" strategy, the other one as developmental regionalism.

[2] Importantly, he also argued that the threshold for 'smallness', which he then set (somewhat arbitrarily) at 10 million inhabitants, would only rise with economic development and the average scale of industrial production and, therefore, increasing the difficulty of economic development in most of the developing world.

The "Market Piggybacking" Model and its Limits

The idea of "piggybacking" on a larger and/or more economically prosperous neighbouring country's demand as an industrial development strategy has been one important feature of economic development in the era of neoliberalism and globalisation. This approach is best exemplified by the industrial strategy pursued by Vietnam (with China), Poland (with Germany) or Mexico (with the USA market).

Vietnam's proximity to China has allowed it to tap into the Chinese supply chain as Chinese labour costs have risen. Many companies have moved their production to Vietnam, attracted by its lower labour costs and improving infrastructure, thereby allowing Vietnam to export intermediate goods (especially in industries such as electronics, textiles, and machinery) back to China and most strategically, to the United States. Thanks to this strategy, Vietnam has enjoyed high economic growth rates, which since 2015 have averaged around 7% (World Development Indicators, 2025). At the same time, however, its dependence on exports has increased significantly. Whereas exports accounted for 54% of the country's GDP in 2010, they account for more than 90% in 2024 (ibid.)

Similarly to Vietnam with China, Poland's economic strategy also exemplifies this model, leveraging the market demand and industrial dynamics of its neighbour, Germany. Benefiting from Germany's industrial demand, technology and increased labour costs, which led several German companies to move production to Poland, attracted by both lower labour costs and a skilled workforce, Poland leveraged its geographic proximity to develop industrial capabilities in the automotive, electronics, and machinery sectors. It is also along these lines that Mexico industrialised, by leveraging its preferential access to the US market allowed by NAFTA (and the subsequent entry into force of the USMCA), the presence of low-wage skilled labour as well as domestic capabilities to attract investments in low carbon technology supply chains (especially in the automotive sector).

The experiences of Mexico, Poland and Vietnam reveal that the ability to tap into another country's market is conditioned by several factors, including signed trade agreements, domestic capabilities, geographic proximity, and transportation costs and by the very capacity for the piggy backing economy to build a purposeful industrial policy around the one of its driver partner (e.g., Poland). Yet, even if those policies are helpful to improve supply-side industrial capabilities, such a strategy has demonstrated important limits. As history shows (especially for Mexico in the Trump years), heavy dependence on a single market can expose a country to economic vulnerabilities if there is a downturn or radical policy change in the larger country. Market diversification and strategic planning are essential to mitigate these

risks. It is also crucial to ensure that this strategy aligns with the long-term domestic developmental goals, rather than locking countries in unsustainable development routes, or to a race to the bottom in terms of labour costs.

Regional Coordination Beyond Common Markets: The Limits of the Linear approach to Trade Integration

The piggy-backing form of industrial development has been facilitated by the pursuit of one form of regional cooperation and integration: the development of free trade agreements (FTAs) and common markets. These, indeed, are very much products of the post-1980s economic Zeitgeist and its confidence in the benefits of trade liberalisation. The liberalisation of trade, the conventional wisdom narrative goes, is the most effective path towards regional integration, at both an economic and political level (Kemp & Wan Jr, 1976). These agreements, beyond the controversial outcomes mentioned above, have generally yielded poor developmental outcomes. When they involve partners with very different development levels, they have tended to entrench the less developed partner in patterns of specialisation in primary goods or cheap labour. More generally, when common markets or free trade zones cover regions with similar productive structures, they have often failed to build up interdependencies (more on this in section 4).

Latin America offers an illustrative example. Despite the existence of numerous and overlapping trade agreements, the region presents some of the lowest indicators of intra-regional integration. Thus, intra-Mercosur (Argentina, Brazil, Bolivia, Paraguay, and Uruguay) trade amounts, in 2022, to a meagre 14% of the group's overall trade, while the equivalent figure for the Central American Common Market (Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador) stands at 13%, for the Andean Community (Bolivia, Colombia, Ecuador and Peru) at about 7.5%. The most dramatic example of this pattern is that of the Pacific Alliance (Chile, Colombia, Mexico, Peru). Although the four nations account for about 41% of the region's GDP, and almost 60% of its total trade, intra-trade within the bloc only represents a mere 2.5% of the group's total trade (Palermo, 2022; Government of Mexico, n.d.).

This inconsistency can be explained in several ways. Firstly, it is a necessary consequence of the productive pattern of the economies in the region which mostly feature export-oriented and highly concentrated productive structures around a few commodities, that is, of their lack of industrial and technological capacity (that is linked, in other regions, to both intra-trade in manufactured goods and in services). Secondly, the limited but existing industrial capacity the region still

possesses has been unable to establish regional productive networks. As a result, trade liberalisation has very little effect on the industrial dynamism of the region. To take one example, the reduction in tariff barriers between Mercosur members has only had a modest impact on the dynamism of the regional automotive industry. More than anything, it has served to give breathing space to the blocs' relatively uncompetitive domestic producers. The total numbers of motor vehicles imported by Brazil from Argentina only accounted for about 9% of its own total production in 2023, and the auto parts exported from Brazil to Argentina represented, in 2022, less than 10% of the former's total output (own calculations using data from ANFAVEA, 2024). This integration has allowed Argentina's automotive industry to remain in business by exporting specific categories of vehicles (e.g., medium-size pickups) to Brazil, while it has allowed Brazil to modestly expand its foreign sales.

To unlock the full benefits that regional cooperation can bring for economic transformation, moving beyond linear approaches to trade integration and emphasize a multi-sectoral programme embracing production, infrastructure, and trade, notably to build regional value chains, is needed to foster industrial transformation and social welfare (Davies, 1996; Ismail, 2018, Stiglitz, 2016). Because the potential of a regional block is more than the sum of their parts, regional developmentalism is also based on the idea that neighbouring countries leverage their complementary assets (whether it is critical minerals abundance, manufacturing capacity, renewable energy potential, as well as proximity to important trade routes) to develop an efficient regional industrial ecosystem around climate-related technologies (Ismail, 2018; Lebdioui, 2022).

From Linear Integration to Developmental Regionalism: The Unresolved Institutional Question

In the development literature, so-called classical development theorists–i.e., the development economics that understood development as a process of industrialisation and structural transformation–have been at the vanguard of the developmental regionalism question. This was particularly true of Latin American structuralists (See ECLAC, 1959; Ferrer 1978). Very early on, they recognised that the progress of import substitution industrialisation (ISI) processes was limited by certain structural limits (i.e., external imbalances, dependence on the import of capital goods, increasing debt burdens). Most notably, Latin American economies were failing to both (i) diversify their exports and make their new local industrial production competitive on international markets, and (ii) substitute imports of the capital goods they now imported in increasing quantities.

As early as 1959, in a document titled *The Latin American Common Market*, the Economic Commission for Latin America and the Caribbean recognised the necessity for greater regional integration: "Latin America," the report argues "will be unable to carry out its development plans … unless it makes a sustained effort to establish within its own territory the capital goods industries of which it is in such urgent need today" (ECLAC, 1959, p. 1). This early confidence in the transformative potential of an enlarged Latin American market was, however, rapidly tempered. Indeed, in the absence of more interventionist and coordinated efforts between regional economies, the creation of a common market was unlikely to solve the problem of the region's dependence on the imports of capital goods or technologies on its own. As Aldo Ferrer (1978, p. 73), a disciple of Prebisch, argued, "[t]he formation of an expanded market between underdeveloped economies, with a low degree of prior interdependence, does not provide sufficient stimuli for the expansion of trade".

Developmentalist scholars also recognised that "[i]n the absence of other elements of action and guidance, international corporations would be the main beneficiaries of regional trade liberalisation and the integration of physical space" (de Appendini, 1971, p. 93). In response, greater attention was to be dedicated to the question of *regional productive integration*, i.e., the promotion of regional specialisation and industrial complementarity (Gomes & Tavares, 1998).[3] The search for productive regional integration, moreover, had to be mindful not to lead to the reproduction, at the regional level, of the centre-periphery polarisation that it was seeking to overcome (Eder, 2019). It would need to guarantee, Ferrer (1978, p. 69) recognised, the "equal distribution of the fruit of productive specialisation". In this pursuit, particular emphasis was placed on the necessity to promote *intra-industrial specialisation*. As Ferrer (1978, p. 70) contended, "[i]ndustrial specialisation at the level of products rather than branches is … the answer to the necessary compatibility between Latin American integration, the equitable distribution of its fruits and integrated development at the national level".

However, this 'balanced regional development' could only be achieved through extensive institutional coordination efforts. As François Perroux, 1955, p. 309 explained, "[g]rowth does not appear everywhere at once; it manifests itself at points or poles of g*rowth*, with varying intensities; it spreads through various channels and with varying final effects for the economy as a whole". One way to

[3] It is important to note, that, in the 1970s, the question of regional integration converged with yet another major ideational trend: that of the fight for the establishment of a New International Economic Order (NIEO). As part of the NIEO agenda, the expansion of the possibility for cooperation between developing nations occupied a very important position (Ahumada, 2025). One important concept associated with the NIEO was that of *collective self-reliance*.

strategically think about this issue was to think about what Lagos (1966) termed 'poles of integration', that is, integrated poles of growth and development maximising the potential for the integration among nations through the creation of mutual interests, shared benefits, regional infrastructures etc. (Perroux, 1968). This question has recently received particular attention as scholars have started to discuss sectors that could more strategically support the development of regional industrial cooperation and integration. Yet, if it was acknowledged that the question of integration would need to "be conceived also as part of a comprehensive national development policy" (Gomes & Tavares, 1998, p. 3), the question of the institutional framework that could allow for the articulation of national development policies (e.g., the selection of the location of development poles, or the maximisation of their integration potential, as well as to govern the distribution of their benefits across national territories), remained largely undefined.

The possibility of regional forms of industrial policy necessarily involves discussing the management not just of domestic but also multilateral forms of conflicts and coordination and the institutional forms required to govern them, (which are further discussed in section 3 and 4). In practice, achieving such a regional coordination of industrial policy is a challenge, across all regions. Political and ideological differences, external influences, and gaps in physical infrastructure connectivity, as well as disparities in economic development levels among neighbouring countries, can generate resistance to regional integration (Lebdioui, 2022). As a result, it is useful to analyse this process through the lens of a prisoner's dilemma.

The Prisoner's Dilemma of Regional Industrial Policy and the conditions for cooperation

To understand the complexity of the regional coordination question, valuable insights are offered by game theory, particularly the Prisoner's Dilemma and the Stag Hunt, two distinct games. The Prisoner's Dilemma describes a situation where actors, pursuing individual advantage, choose strategies that benefit them separately but harm them collectively—i.e., mutual defection becomes rational despite mutual cooperation being superior, because each has incentive to defect regardless of what others do. The Stag Hunt, in turn, describes a situation where actors recognise that coordinating their strategies would benefit all, yet fail to achieve this coordination because each fears the others will not commit.

Both frameworks directly apply to our present discussion. In developing regions, the reality of shared conditions, problems and challenges faced by each individual country (e.g., concentrated productive structures, external imbalances,

high un- and under-employment), often leads countries to behave as if in a Prisoner's Dilemma, that is, preferring autonomy over cooperation. This is most often visible in two key aspects: in attracting foreign direct investments (FDIs) and in the redundancy of industrial policy plans across countries in a given region. The attractiveness of autonomy seems all the more rational given that the cost of non-cooperation is low since defection simply maintains the status quo of limited interaction rather than risking destroying existing relationships.

Yet the objective reality more closely resembles a Stag Hunt. Most countries are highly unlikely to achieve meaningful economic transformation either through FDI attraction alone or uncoordinated industrial policy pursued in isolation. As we have explained, markets remain too small to support scale economies, capabilities too limited to compete globally, and resources too constrained to build comprehensive industrial ecosystems. This is true even in the case of the USA, as Allan (forthcoming) shows with respect to the limits of the Inflation Reduction Act in the absence of a coherent international strategy. This coordination failure means countries forfeit massive opportunities to pool resources, share the costs of large-scale infrastructure projects, or create integrated value chains that would benefit all participants. This can be referred to as the 'developmental price of anarchy', i.e., the developmental cost of non-cooperation (more on this in section 4).

Against this background, the task is to think about institutional configurations that could allow countries to both escape their preference for defection (non-cooperation) and at the same time genuinely addressing problems of coordination failures. Here the seminal work of Axelrod & Keohane (1985, p. 227) on the nature and characteristics of the institutional frameworks supporting cooperation provides us with important analytical elements. It is possible to distinguish at least three key dimensions influencing the conditions of cooperation among national states: the mutuality of interests, the number of participants, and the shadow of the future.

The first dimension is the capacity for individual states to recognise a 'mutuality of interests'. 'Cooperation', Axelrod and Keohane (1985, p. 227) recall, 'is not equivalent to harmony. Harmony requires complete identity of interests, but cooperation can only take place in situations that contain a mixture of conflicting and complementary interests'. The degree of mutuality of interest is fundamentally determined by the understanding participants have of their own interests. This, as we will explore in more details below, is itself linked with their capacity to adequately perceive the benefits they could gain from cooperation or the costs of anarchy.

Secondly, cooperation is also affected by the number of participants in cooperative arrangements. It is evident that large associations of countries create more difficult mechanisms of coordination and cooperation. Not only is the possibility of aligning interests more complex, but also the capacity to ensure reciprocity between the participants (Axelrod & Keohane, 1985; Keohane, 1986). This is why successful regional cooperation often develops according to an expansionary dynamic, based on the desire to integrate new participants, rather than on the basis of the largest possible number of participants from the outset. To the emphasis on the number of participants should also be added an emphasis on the number of issues being the objects of cooperation (see section 4). An extremely ambitious cooperation agenda reduces the likelihood of cooperation.

Finally, cooperation is also determined by the so-called 'shadow of the future'. Fundamentally, this concept refers to the (un)certainty of the commitment to cooperation by the participants. Axelrod and Keohane (1985, p. 232) identify four key factors necessary to mitigate the risk the shadow of the future imposes on cooperation: (i) long-time horizons; (ii) regularity of stakes; (iii) reliability of information about the others' actions; and (iv) quick feedback about changes in the others' actions'. In a context of weak interdependences, the possibility of defection is high as its perceived cost is low. Indeed, it would only mean the reproduction of the *status quo*. The capacity of the institutional structure in charge of facilitating cooperation and coordination to ensure that they engage on a regular basis and in dialogues based on a transparent sharing of information is essential to allow for mutual trust to be built between countries.

3. A Three-Level Framework for the Coordination of Industrial Policy: Minilateral, Plurilateral, and Supranational.

The Regional Industrial Policy Toolbox

From a policy perspective, developmental regionalism implies regional measures that do not only consist in horizontal policies (which are sector-neutral) that are principally concerned with harmonisation of norms, the integration of physical infrastructures or macroeconomic systems across nations, but also vertical ones. Existing examples of regional horizontal policies are numerous, from the building of transnational electricity grids to the harmonisation of fiscal rules, or the creation of common macroeconomic mechanisms like currency unions (see Table 1).[4] The

[4] The European Union evidently offers the most illustrative example of regional integration and coordination in horizontal policies with the establishment of European norms and infrastructures, as well as macro-financial conditions (Eder, 2021). It is important

industrial policy literature has, however, emphasised the limits of horizontal policies as a necessary but insufficient condition for structural transformation (Chang, 1994; Cherif and Hasanov, 2019; Mazzucato, 2016). Vertical policies aim at supporting the development of sectors that are unlikely to emerge spontaneously and therefore aim to defy the logic of comparative advantages and of the market (Lin & Chang, 2009). They are as Amsden (1992) famously expressed, policies that deliberately aim to 'get relative prices wrong'. At the regional level, vertical policies can take a variety of forms, from the use of regional development banks able to provide subsidised credit, to the promotion of regional champions, or the pursuit of joint-research programmes, or pooled and coordinated procurement.

Table 1: Regional Industrial Policy Toolbox

	Supply	**Demand**
Horizontal	● Infrastructural Integration ● Regulatory Harmonisation ● Monetary Integration ● Cumulative rules of origin	● Common Market ● Monetary Integration
Vertical	● Regional Investment Promotion Agencies ● Joint Research Programs ● Joint Investment Programs ● Regional Development Banks ● Resource Cartels ● Coordinated Subsidies ● Regional Clusters ● Joint-Ventures ● Coordinated Skills Programs	● Coordinated Green Public Procurement ● Harmonized Consumer Tax Benefits ● Coordinated Climate Plans ● Regional (green) external tariffs

Three-Level Regional Coordination Models

From an institutional standpoint, it is possible to identify three distinct levels of industrial policy coordination: the supranational level, the plurilateral level, and the minilateral level, each presenting different trade-offs between potential gains from cooperation and political feasibility (see Table 2).

to briefly mention one horizontal policy that has a great impact on the promotion of industrial activities: cumulative rules of origins. Cumulative rules of origin enable member countries within preferential trade agreements to collectively satisfy origin (or local content) requirements. This mechanism treats inputs from any member country as 'domestic' when calculating whether a final product qualifies for certain preferential treatment. It effectively allows production processes to span multiple national borders. Thus, rather than requiring each country to independently meet minimum content thresholds, cumulation permits the aggregation of value-added activities across a whole region, thereby creating incentives for cross-border production networks.

Supranational coordination represents the most ambitious and institutionally dense form of regional industrial policy cooperation. It is characterised by the delegation of significant authority to a central body capable of setting binding rules, allocating resources, and enforcing compliance across member states. Supranational coordination maximises potential gains but faces high coordination costs, institutional rigidity, and risks of asymmetrical outcomes that can undermine both trust and national sovereignty and, as a result, the capacity to implement cooperative arrangements. Historically, many integrationist attempts have tended to be structured around an extremely vast cooperation agenda, involving complex institutional structures hindering, effective decision-making and involving the cessation of sovereign power and as such is extremely vulnerable to political pendulum swings. Indeed, even in regions such as the EU which have managed to create a functioning supranational structure, the success of the coordination of industrial policies across countries remains contested (Draghi, 2024).

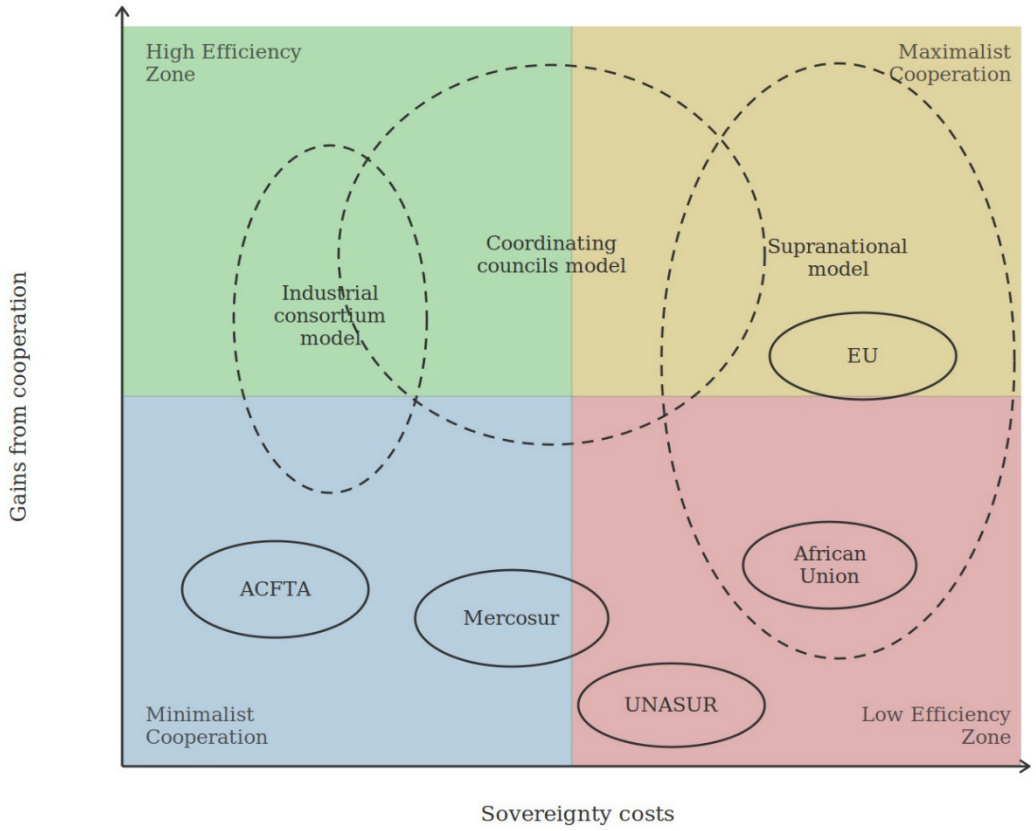
Meanwhile, plurilateral coordination lowers political barriers and enables direct coordination between national governments (ultimately responsible for the implementation of industrial policy). It provides a middle path that facilitates identification of productive complementarities while maintaining institutional flexibility. At the same time, however, this form of coordination possesses weaker enforcement mechanisms and more uncertain benefits. If not based on binding agreements and pooled resources, plurilateral coordination delivers uncertain material outcomes (Albertone et al., 2025).

Lastly, minilateral coordination necessarily constrains the potential benefits to those achievable within smaller coalitions, across nations and sectors. With a central idea to 'bring to the table the smallest number of participants needed to have the largest possible impact' (Naim, 2009, p. 136), minilateralism provides the framework to achieve high effectiveness in narrow domains but often cannot sustain systemic transformation.

Table 2: Three Levels of Multilateral Coordination

	Examples	*Benefits*	*Limitations*
1st Level: Supranational Coordination	European Union African Union	Greater and more diverse potential benefits from coordination	High coordination costs, institutional rigidity, High risk for asymmetrical outcomes, Difficulty to maintain trust, Risk of *de facto* inefficacy
2nd Level: Inter-governmental Coordination	ASEAN Coordinating Councils	Easier to identify productive complementarities, Open to a plurality of institutional configurations	Risk of *de facto* inefficacy, Uncertain potential benefits from cooperation
3rd Level: Minilateral Coordination	· Airbus (joint initiative between the governments of France, Spain, Germany and UK) Singapore-Australia Green Economy Agreement UK and Norway Green Industrial Partnership	More realistic in context of low interdependence or low trusts between the participants, Open to a plurality of configurations amongst a coalition of the willing	Limited potential benefits from cooperation amongst fewer actors

Figure 1: The Origami Graph of Coordination



Examining the strengths and limitations of each model, the broader theoretical implication is that there is no single optimal model of regional industrial coordination. Instead, institutional design must be contingent on existing levels of trust, interdependence, and sectoral characteristics. In green industrial policy, where technological uncertainty, regulatory heterogeneity, and political conflict are intrinsic, the most viable strategies may involve hybrid architectures: minilateral projects embedded within plurilateral or multilateral platforms, rather than full supranational integration. The rest of this section discusses empirical experiences from different regions and suggests a shift away from cooperative maximalism towards what might be termed pragmatic coordination: selective, flexible, and politically credible arrangements that prioritise feasibility over institutional ambition. This challenges traditional regional integration approaches and aligns more closely with evolutionary and political economy approaches to industrial policy in a fragmented global order.

Supranational Coordination: The Limits of EU-style Cooperative Maximalism

The developmental perspectives offered by supranational coordination have been the source of intense policy debates since the wake of post-independence state formation in the developing world and the post-WWII reconstruction in Europe.

Empirically, the European Union and the African Union illustrate two different expressions of the supranational model: one highly institutionalised and legally embedded, the other more aspirational and politically constrained. Despite their differences, both cases reveal a fundamental tension inherent in supranational coordination: while it promises the largest aggregate gains from cooperation, it also exhibits the highest coordination costs and the greatest risk of institutional overreach.

The European Union (EU) represents the most advanced experiment in supranational industrial coordination globally. Through mechanisms such as the Single Market, cohesion policy, state aid rules, and more recently the Green Deal Industrial Plan, the EU has sought to align national industrial strategies around collective objectives, particularly in green and digital sectors. Theoretically, this corresponds to the strongest form or "positive integration" (as referred in Tinbergen, 1954) or later understood as 'developmental regionalism' (Ismail, 2018), where not only barriers are removed, but new common policies are actively constructed to exploit scale economies and coordinate investment in strategic sectors (Aghion et al., 2015; Lebdioui, 2022).

Empirically, the EU has indeed generated substantial benefits, which confirm the basic theoretical proposition that supranational governance can expand the feasible set of industrial policies beyond what is achievable at the national level. For instance, cohesion funds have facilitated infrastructure development in peripheral regions; the Single Market has supported the emergence of transnational value chains; and recent industrial instruments such as the Important Projects of Common European Interest (IPCEIs) have mobilised large-scale investment in batteries, hydrogen, and semiconductors (Eisl, 2022).

However, the same empirical evidence also exposes the structural limits of what may be termed "cooperative maximalism". First, supranational coordination entails extremely high transaction and political costs. Decision-making requires complex bargaining among heterogeneous states with divergent economic structures, fiscal capacities, and political priorities. This generates what Scharpf (1988, 2006) famously described as the "joint-decision trap": policies converge towards the lowest common denominator or are delayed to the point of irrelevance. In green industrial policy, this problem is acute. Member states differ sharply in their energy systems, industrial bases, and exposure to transition risks, making agreement on common instruments politically difficult. The cost of cooperative maximalism is also evident in the case of digital sovereignty, where misalignments have prevented tangible progress for a common strategy towards building digital champions (Draghi, 2024).

Second, supranational coordination carries a high risk of asymmetrical outcomes. Although the EU formally promotes convergence, empirical studies show persistent divergence in productive capabilities across regions, with advanced economies capturing disproportionate shares of innovation rents and industrial upgrading (Farole et al., 2018; Eder and Schneider 2018). IPCEIs, for example, have been heavily concentrated in Germany and France, reflecting differences in fiscal space and administrative capacity. This dynamic undermines the legitimacy of supranational coordination and erodes political trust, especially among weaker member states.

Third, institutional rigidity is a structural feature of supranational systems, as recently echoed by French President Macron in his 2026 Davos speech. Once competencies are delegated and legal frameworks established, adaptation becomes slow and path dependent. This is problematic in green transitions, where technological trajectories are uncertain and policy learning and adaptation is essential (Lebdioui, 2024).

The African Union (AU) illustrates these tensions in an even more pronounced way, albeit from a different starting point. Unlike the EU, the AU lacks strong fiscal instruments, enforcement mechanisms, and legal authority. Its flagship industrial initiative, the African Continental Free Trade Area (AfCFTA), aspires to create a continental market that supports industrialisation through regional value chains. Yet empirically, the AU's supranational ambitions are constrained by weak state capacity, low levels of intra-African trade, and limited trust among governments (Lopes, 2024). Coordination costs are extremely high, leading to a "de facto inefficacy": ambitious frameworks with limited practical implementation. This highlights a key theoretical insight: supranational coordination presupposes not only institutional authority, but also deep economic interdependence and relatively symmetric capacities. Absent these conditions, supranationalism risks becoming performative rather than transformative.

Taken together, these cases suggest that supranational coordination is best understood as a high-risk, high-reward institutional strategy. While it can generate large collective gains in contexts of strong interdependence and political cohesion, it is structurally vulnerable to coordination failures, legitimacy deficits, and rigidities. Theoretically, this challenges overly optimistic views of regional integration in industrial policy, which has been a developmental aspiration in many regions. Rather than a universal solution, supranational coordination appears as a bounded model whose feasibility depends on historically specific configurations of trust, symmetry, and institutional capacity.

Plurilateral Coordination: Lessons from ASEAN's Flexible Institutionalism

Plurilateral or intergovernmental coordination represents an intermediate model of regional industrial policy cooperation. Unlike supranational systems, authority remains firmly with national governments, and regional institutions operate primarily as platforms for dialogue, information exchange, and voluntary coordination. The Association of Southeast Asian Nations (ASEAN), through its coordination council, exemplifies this model through what is often described as "flexible institutionalism" or a 'bamboo' approach denoting a consensus-based decision-making, non-binding commitments, and strong respect for national sovereignty (Acharya, 2001; Ravenhill, 2015; Albertone et al., 2025).

Launched in 2015, the ASEAN economic community aims to create a single market and production base, characterised by free movement of goods, services, investment, skilled labour, and freer flow of capital. This initiative seeks to enhance the region's global competitiveness by reducing trade barriers, harmonising standards, and simplifying customs procedures. By creating a more integrated economic space, ASEAN member states aim to attract more foreign direct investment and foster intra-regional trade. ASEAN's flexible institutional arrangements based on non-interference and quiet diplomacy have enabled regional bargaining and dialogue, allowing member states to identify shared strategies and targets while respecting national sovereignty (Albertone et al. 2025; Mahaseth & Narain, 2022).

ASEAN has established multiple sectoral coordinating bodies, including the ASEAN Economic Community (AEC) and numerous working groups on energy, digital economy, and green growth. ASEAN councils' system allows countries to retain control over decision-making, fostering collaboration through consensus-based approaches, facilitating dialogue between governments directly and leaving much greater autonomy for sovereign member states to design their own policies and emphasise policy harmonisation and consensus on implementation of regional initiatives. Moreover, in economic affairs, ASEAN has established the 'ASEAN minus X' formula that allows subsets to move forward on issues where consensus does not exist while leaving open the possibility for non-initially participating countries to join at a later stage. Industrial policy coordination within ASEAN is indeed further supported by initiatives such as the ASEAN Industrial Cooperation Scheme (AICO), aimed to promote joint manufacturing industrial activities between ASEAN-based companies.

The focus of the regional coordination of industrial policy in the region has been sectors where ASEAN already has competitive advantages, (such as electronics, automotive, and agro-based industries), and where collaboration

approach allows member states to leverage their individual strengths while benefiting from regional synergies. These platforms have supported regional initiatives in standards harmonisation, infrastructure connectivity, and investment facilitation in various sectors, including electric vehicles supply chains (Dent, 2016; Hill & Menon, 2014).

From a theoretical perspective, this model corresponds to a form of "soft coordination" or "open regionalism", where the primary function of regional institutions is to reduce information asymmetries, facilitate learning, and enable selective cooperation without imposing binding constraints (Abbott & Snidal, 2003; Börzel, 2011). The key promise of this model is lower coordination costs and greater political feasibility, especially among heterogeneous states with limited trust. Empirically, ASEAN's experience in industrial and economic coordination reflects both the strengths and weaknesses of this approach.

On the positive side, one clear advantage of this model is its openness to institutional plurality. ASEAN does not impose a single industrial strategy or policy template and member-countries have pursued highly differentiated industrial paths, from Singapore's high-tech services model to Vietnam's export-oriented manufacturing and Indonesia's resource-based industrialisation, while still benefiting from regional market access and policy dialogue. The institutional flexibility demonstrated by ASEAN's councils' system is, in that perspective, better suited to regions with significant political and economic diversity, as they enable countries to align their strategies without requiring deep institutional integration. Moreover, ASEAN's flexible institutionalism reduces political resistance as it preserves national policy autonomy. This is particularly important in green industrial policy, where governments face strong domestic distributional conflicts and must retain discretion to manage transition risks.

However, the ASEAN model also presents challenges. The same features that make plurilateral coordination politically feasible also limit its transformative capacity. The absence of binding commitments, large funding mechanisms, and enforcement mechanisms generates a high risk of "de facto inefficacy". Many ASEAN initiatives remain declaratory, with limited impact on actual investment patterns or industrial upgrading (Ravenhill, 2017). In green coordination, for example, regional targets for renewable energy integration and EV battery supply chain development have progressed slowly, and cross-border infrastructure projects face persistent financing barriers. Unlike supranational systems, where collective resources can be mobilised, intergovernmental coordination relies on voluntary national contributions, which makes it difficult to finance large-scale green industrial projects that require long-term, coordinated investment and patient

capital (Anzolin & Lebdioui, 2021). The benefits of cooperation remain contingent and uneven, depending on the willingness and capacity of individual states.

Notwithstanding limitations, the ASEAN model of industrial policy coordination can nevertheless offer valuable lessons, especially as it shows how adopting a flexible, complementary approach to regional integration and industrial policy could help manage diverse national interests while promoting economic collaboration and development. From a broader theoretical perspective, ASEAN suggests that plurilateral coordination is best understood as an enabling rather than directing model. It creates institutional space for coordination but does not itself generate industrial transformation. Its effectiveness depends heavily on the presence of strong national developmental states capable of using regional platforms strategically. In this sense, ASEAN aligns with a "facilitative regionalism" logic, where regional institutions complement, rather than substitute for, national industrial policy (Dent, 2016; Wade, 2010).

In contrast, supranational bodies offer stronger enforcement mechanisms and can streamline decision-making, but they are often perceived as undermining national sovereignty and are less adaptable to the unique needs of individual countries, which lead to complete withdrawal from participating members. Thus, the ASEAN case challenges both supranational idealism and purely national models. It shows that flexible intergovernmental coordination can lower political barriers and support learning, but it cannot, by itself, resolve deep coordination problems or mobilise transformative investment.

Minilateral Coordination: Lessons from Airbus' Negotiated Division of Labour

Minilateral coordination represents the most selective model of regional cooperation. In industrial policy, this model is particularly attractive in contexts where broader coordination is politically unlikely to happen. The history of Airbus is an emblematic case of industrial policy coordination at the minilateral level, that is, through a coalition of the willing around specific projects or sectors.

In the late 1960s, European national players were increasingly faced with the risk of becoming uncompetitive or being relegated to the margins of the aircraft market. Individual companies, such as France's Sud Aviation, Germany's Dornier and Messerschmitt-Bölkow-Blohm, and United Kingdom's Hawker Siddeley and British Aircraft Corporation had all pursued independent development and innovations programmes, but none of them had the scale of their American counterparts (i.e., Boeing, McDonnell Douglas, or Lockheed). In response, political leaders from France, Germany and the United Kingdom agreed in 1967, 'for the purpose of strengthening European cooperation in the field of aviation technology

and thereby promoting economic and technological progress in Europe', 'to take appropriate measures for the joint development and production of an airbus' (Slotnick, 2020).

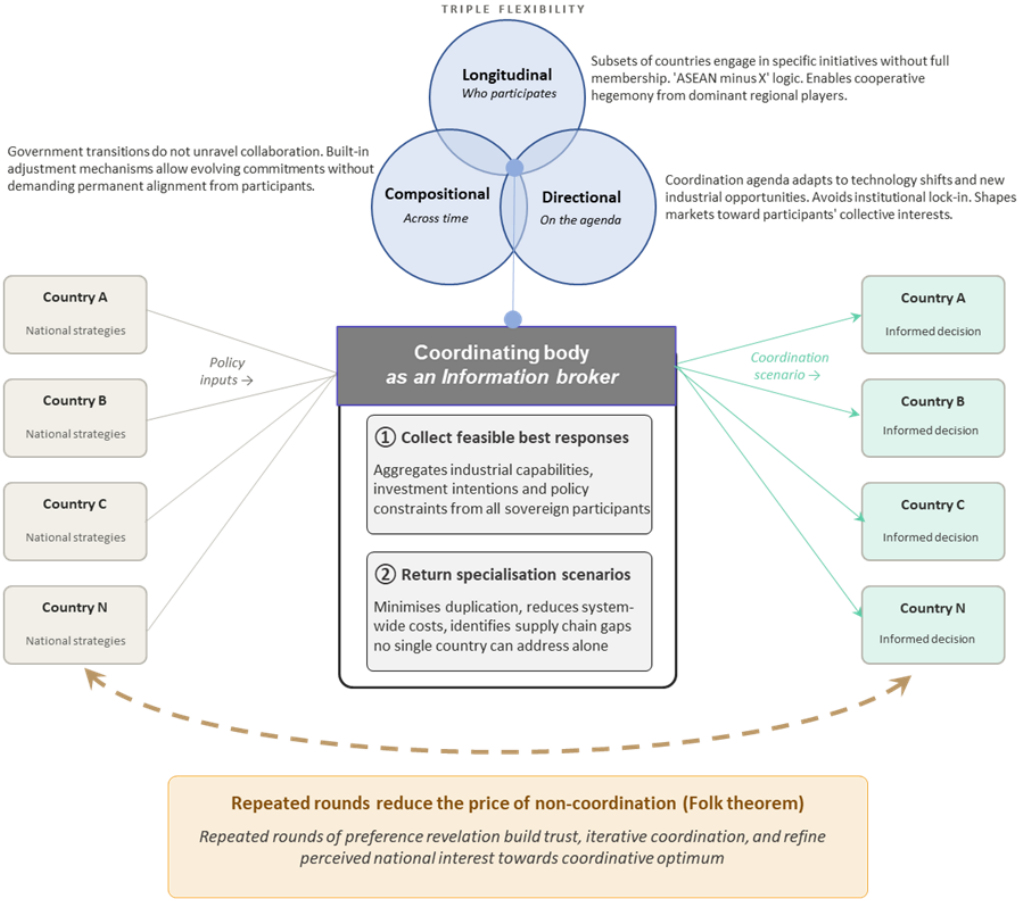
The most important barrier to the Airbus project was the necessity for governments to agree on the division of labour and specialisation among their national firms and territories. Thus, a key dimension of the story of Airbus is the role of Roger Béteille, a French aeronautical engineer appointed as Technical Director of the A300 program in 1967. Working closely with Felix Kracht–Airbus's first production director–he crafted what came to be known as a 'work-share agreement', that is, a proposal for the distribution of productive specialisation across partnering countries (Morgenstern and Schulz, 2004). This form of coordination, that can be described as a *negotiated division of labour*, ensured that each partner could capture tangible industrial benefits, thereby increasing the likelihood of maintaining political commitment over time.

This arrangement generated significant collective gains. Not only did Airbus successfully challenge Boeing's monopoly and create a globally competitive European aerospace industry but the consortium facilitated large-scale investment, technological learning, and risk-sharing across national boundaries (Niosi & Zhegu, 2005). The key theoretical insight from Airbus is that coordination effectiveness may in fact depend less on institutional depth than on credible commitment and distributive balance. By explicitly negotiating the allocation of benefits, Airbus reduced the risk of asymmetrical outcomes and maintained trust among partners. This contrasts sharply with supranational systems, where distributive effects often emerge implicitly and generate political backlash (Eder and Schneider, 2018).

The structural limitation of minilateralism lies in its scope. By definition, cooperation among few actors restricts the scale of potential gains and excludes broader spillovers. Furthermore, while they may be effective locally, they can undermine broader coordination by creating parallel regimes and competitive blocs (Keohane & Victor, 2011). In green transitions, this could exacerbate technology gaps and geopolitical competition within regions rather than fostering inclusive development. From a theoretical standpoint, minilateral coordination should therefore be seen as a second-best institutional solution: highly effective under conditions of low trust and high uncertainty but inherently limited in transformative potential. Its strength lies in feasibility and targeted nature, while its weakness lies in limited scale and inclusiveness.

4. Introducing a New Model of Coordinative Optimisation based on triple flexibility and coordinating agents

Figure 2: A Model of Coordinative Optimisation for Regional Industrial Policy



4.1 Triple Flexibility of Coordination Systems and the Question of the Hegemon

The first critical aspect drawn from the historical experiences reviewed in section 3 relates to the need for flexibility. In the way that ASEAN does not impose a single industrial strategy or policy template, the idea of providing flexibility in the anticipation of necessary adjustments is consistent with evolutionary and institutionalist theories of development, which emphasise diversity, experimentation, and policy learning over uniformity (Sabel & Zeitlin, 2012; Lebdioui et al., 2026). In the case of regional coordination of industrial policy, we argue that institutional flexibility can be conceived and practiced along three dimensions: compositional, longitudinal and directional (see Table 3).

Table 3: Varieties of Institutional Flexibility

Flexibility in the scope of Participants *(Compositional Flexibility)*	**Flexibility Over Time** *(Longitudinal Flexibility)*	**Flexibility in the Agenda** (*Directional Flexibility*)
Some regions are characterised by significant diversity in economic development, political systems, and political ambitions. Spatial flexibility allows countries to adapt regional policies to their specific contexts, ensuring that all participants can engage to the extent they are comfortable without jeopardising collective goals. This is particularly important in a region where political ideologies often swing between left and right, creating shifting alliances and priorities.	Longitudinal flexibility ensures that regional coordination mechanisms can accommodate these changes over time without disrupting ongoing collaboration. For example, a change in government should not derail a country's participation in a regional green industrial policy initiative. Instead, the mechanism should allow for adjustments in commitments and strategies as national circumstances evolve.	The dynamic nature of industrial policy demands mechanisms that can adapt to rapidly evolving technologies, market conditions, and global climate commitments. Directional flexibility ensures that regional coordination frameworks can pivot as new market opportunities and challenges emerge. This kind of flexibility not only helps countries adopt the right regional strategies but also shapes markets in ways that align with their interests.

Those three types of flexibility can not only be self-reinforcing but can also heavily influence each other. When it comes to directional flexibility, it must be stressed that not all sectoral directions are equal. There are common and shared interests for sectoral coordination and supply chain development that reinforce the gains from -and subsequent of- regional coordination , or what Keohane & Victor, (2011, p. 9) term '*institutional linkages*': '[m]any issue-areas lend themselves to linkages as a way to enlarge the scope for deal-making, which encourages integration'. Thus, an aspect of institutional flexibility is to be designed in such a way as 'to encourage linkages that increase the gains from cooperation and strengthen the incentive for compliance' (ibid.).

Lastly, when it comes to compositional flexibility, it is worth raising the question of the presence, in a given region, of one or several natural hegemonic powers in leading regional coordination efforts. The presence of regional hegemons does not necessarily prevent regional cooperation. As Pedersen (2002, p. 678) writes 'in a number of regions, where institutionalisation has succeeded, there has been a significant resource asymmetry within the confines of a unipolar system with the initiative for regional institutionalisation coming from the biggest power in the region or from a duopole'. The successful formation of regional institutional mechanisms, he argues, can principally be explained via the concept of *cooperative hegemony*. The role of China in East Asian supply chain development

can be understood in that light. Meanwhile, regional coordination in Latin America is hard to conceive without proactive leadership from the government of Brazil. Cooperative hegemony, Pedersen (2002, p. 684) explains, relies on three major pillars: 'the capacity for power-sharing vis-à-vis smaller states in a region, for power aggregation on the part of the predominant regional state(s), and for commitment to a long-term regionalist policy strategy'. To this, we should also add the capacity, highlighted just above, of inducing development in smaller nations. Thus, by increasing the potential scale of benefits and change that could be achieved through cooperation and coordination, by helping to provide a long-term vision, the presence of a hegemon, can foster rather than hinder the institutionalisation of regional industrial policy.

4.2 Coordinating Agents for the 'Negotiated Division of Labour'

The question we must now ask is the question of how nations can develop a shared understanding of specialisation that benefits each country and a region as a whole? This, indeed, is arguably essential to both clarify the *perception* of mutually beneficial coordination and to dissipate the 'shadow of the future' (see section 2.4). In other words, what institutional arrangements best facilitate the kind of agreements that took place in the Airbus case, but for a wider range of issues and a more diverse set of countries?

The complexity of this problem makes it an ideal candidate for analysis through the lens of complex systems thinking. Essentially, it involves thinking about *cooperative optimisation* between multiple actors (countries, firms, or industries) and their decisions within a regional framework. Here, we explore the issue through the framework developed by Mengdi Wang in a 2015 paper titled "Vanishing Price of Anarchy in Large Coordinative Nonconvex Optimization". Wang's model provides a useful framework for understanding how to coordinate the action of individual participants so that, in aggregate, their specialisations align to achieve near-optimal regional outcomes. Wang's model is particularly relevant because it demonstrates how strong coordination can yield near-optimal outcomes even when individual participants face nonconvex decision problems, that is, decision-making scenarios where costs or payoffs are not smooth or linear, often involving fixed costs, discrete choices, or economies of scale. For example, a country deciding whether to invest in a solar panel manufacturing facility faces a nonconvex problem: the decision involves significant upfront costs as well as discrete outcomes (e.g., either building the facility or not). In the context of regional industrial policy, the *fallacy of composition* arises when each country, acting in its own self-interest, chooses a strategy that appears locally optimal but collectively leads to inefficiencies or misalignment.

In game theory, this leads to what we have already defined as the *price of anarchy*, a concept that provides a useful metric for understanding the trade-offs between self-interested decisions and coordinated outcomes. The price of anarchy is defined as:

$$price\ of\ anarchy =$$

$$(value\ of\ purely\ self\ interested\ outcome) - (value\ of\ truly\ optimal\ outcome)$$

Translated into the terms of our discussion, this gives us the following equation:

$$price\ of\ non\ coordination =$$

$$(value\ of\ national\ interests)\ -\ (value\ of\ optimal\ regional\ coordination)$$

This insight is particularly valuable for coordinating green industrial policy in a regional context where the price of anarchy is arguably high. In the context of green industrial policy, Wang's model can be adapted as follows:

i. *Participants*: Countries or major industrial players in the region.
ii. *Decision Set*: The set of possible strategies for each country when it comes to green technology production or adoption, such as investing in solar panel manufacturing, building battery factories, or expanding wind turbine capacity. These strategies can be discrete or continuous.
iii. *Preference/Cost*: A nonconvex function representing each country's internal cost or payoff for a particular specialisation (e.g., lumpsum investments, stepping up to new technology platforms, or discrete "adopt/do not adopt" decisions).
iv. *Impact*: A measure of how each country's choice affects regional resources or supply-chain factors, such as total emissions, region-wide capacity for critical inputs, or the availability of intermediate goods.
v. *Region-Wide Objective*: A function representing the region's collective goal, such as minimising net pollution or maximizing green industrialisation or climate impact reduction, which depends on the sum of each country's contributions.

The central challenge is to coordinate the choices of individual countries so that the region-wide objective is optimised. Following Wang (2015, p. 18), this can be achieved "as long as the participants are cooperative and a central decision maker properly coordinates the individuals' behaviors". One essential aspect of a problem thus is the institutional form that could contribute to its solution. In thinking about this question, it is important to recognise that a "[c]coordination problem is essentially an approximate projection problem" (Wang, 2015, p. 15). What is required is a central coordinating body to set overarching targets and facilitate

information sharing among participants. The coordinating body does not need to dictate individual decisions but instead collects each country's feasible "best responses" and orchestrates a coherent set of actions that minimise total system cost and maximise region-wide outcomes. Thus, the coordinator functions not as a supranational authority imposing solutions, but as an "information broker" that systematically collects, aggregates, processes distributed information and presents feasible coordination options to sovereign participants.

Another key insight deriving from this proposed model is that coordination does not necessarily involve imposing a top-down plan, nor just waiting for each country's final choice. Instead, optimal coordination implies collecting each country's feasible "best" actions and then helps share information that helps orchestrate who invests in what (possibly supporting a cross-border supply chain plan). Each country/participant can have multiple local solutions that yield the same private cost but only a subset of them will collectively yield near-optimal regional outcomes. As such, this type of coordination involves individual participants (countries or firms) ultimately making their own informed decisions in a way that would align with both their own interests and the region's collective goals. The role of the "coordinator" would thus ultimately consist of two principal positions: that of a (i) collector of best "responses'/ green industrial policies from all countries, and that of (ii) a facilitator of best policy responses/sectoral specialisations from each country in a way that minimises total system cost and maximises region-wide welfare and supply chain resilience.

4.3 The folk theorem meets regional industrial policy: supply chains optimisation to bridge national industrial interests with collective gains

The iterative nature of the negotiating process is a key factor of cooperation. The coordinating institution is more effective if its institutional layout allows for repeated rounds of information revelation and preference adjustment. This is also known as the Folk Theorem: the principle that repetitive interactions increase the likelihood and sustainability of cooperation. Unlike one-off negotiations, the councils would create ongoing relationships where countries interact repeatedly across multiple sectors and time periods. Thus, in each round, countries submit updated assessments of their industrial capabilities, investment intentions, and policy constraints. The coordinating body then generates multiple feasible specialisation scenarios, each showing the distribution of benefits and costs across participants. This iterative structure allows countries to observe how different coordination arrangements would affect their national outcomes while learning about their neighbours' plans, capabilities and constraints. The goal is not equal outcomes but proportional benefits that sustain each country's domestic political coalition supporting coordination.

5. Conclusion: From the Prisoners' Dilemma to Pacts of Productive Complementarities

This paper started from an uncomfortable geopolitical reality. Neo-mercantilist impulses, green protectionism, and carbon border adjustment mechanisms are compressing the development space available to latecomers at precisely the moment when climate imperatives and digital transitions are creating new windows of industrial opportunity, including green windows of opportunity (Lema et al. 2020). The pursuit of unilateral (green) industrial strategies risks producing a classic prisoners' dilemma: each country makes locally rational decisions that are collectively self-defeating, replicating efforts, and failing to achieve the scale economies that make advanced green technologies competitive.

The paper has made three linked contributions in response to this diagnosis.

First, we attempt to bring light to the variety of institutional mechanisms for regional industrial policy coordination through a three-level typology, spanning supranational, plurilateral, and minilateral forms, each with a distinct profile of potential gains and political costs. The comparative analysis of the European Union, ASEAN, and Airbus reveals that no single model is universally superior. Supranational coordination maximises the theoretical gains from pooled action but carries the highest coordination costs, institutional rigidity, and risks of asymmetrical outcomes that erode political legitimacy over time. Intergovernmental plurilateral coordination, as exemplified by ASEAN's flexible institutionalism, lowers political resistance and accommodates heterogeneity but struggles to mobilise transformative investment or enforce the commitments needed to build integrated regional value chains. Minilateral coordination, as illustrated by the Airbus consortium, can generate large concrete gains within a narrow coalition but remains inherently limited in sectoral scope.

Second, drawing on complex systems theory and the mathematical framework of coordinative optimisation, we argue that an optimal coordinating body serves as an information broker rather than a supranational authority: an institution that collects feasible best responses from sovereign participants, aggregates distributed preferences and capabilities, and returns coherent specialisation analyses that minimise duplication, reduce system-wide costs, and identify supply chain shortfalls that no single country can address alone. This model enables what we have termed a negotiated division of labour at scale, recovering the productive logic that drove Airbus while extending it to a more diverse set of countries and sectors.

Third, we introduced the principle of triple flexibility as a structural design requirement for any such coordinating framework. Compositional flexibility allows

subsets of countries to participate in specific initiatives without requiring uniform engagement across all members, a crucial concession to the political and ideological diversity that characterises most developing regions. Longitudinal flexibility ensures that government transitions and shifting domestic coalitions do not unravel ongoing collaboration, by building in mechanisms for the adjustment of commitments over time rather than demanding permanent alignment. Directional flexibility allows the coordination agenda to evolve alongside technological change, shifting global demand, and emerging comparative advantages, avoiding the institutional lock-in that has made more ambitious regional architectures brittle. Together, these three dimensions of flexibility constitute a response to what previous integrationist attempts have too often overlooked: that regional cooperation among sovereign states is not a one-time act of political will, but a sustained, adaptive process that must be continuously reproduced through demonstrated benefits and credible institutional design.

Several important implications follow from this analysis. The most urgent is that the current moment, marked by the fracturing of the post-1945 multilateral trade order and the intensification of great power competition over green technology supply chains, is as much an opportunity as it is a threat for developing regions as it creates openings for countries that can coordinate their productive capacities and their negotiating positions. As the cautionary tales of Ethiopian industrial parks built around access to the US market under the African Growth and Opportunity Act demonstrate, a strategy of market piggybacking without regional coordination leaves developing nations acutely vulnerable to external shocks. Regional coordination is not a second-best substitute for integration into global value chains. It is the precondition for entering those chains on terms that generate durable developmental gains.

A second implication concerns the relationship between regional coordination and national sovereignty. One of the persistent failures of regional integration projects, in Latin America, Africa, and beyond, has been the conflation of coordination with the cession of sovereign authority. The model advanced in this paper is deliberately designed to avoid this conflation. Participating countries remain the authors of their own industrial strategies. The coordinating body does not impose specialisations but presents the consequences of different combinations of national choices in terms of regional welfare and supply chain resilience. This reframing, from integration as sacrifice to coordination as strategic intelligence, offers a more politically viable foundation for sustained cooperation among governments that face strong domestic constituencies and rapid electoral cycles.

A third implication concerns the sequencing and scope of coordination efforts. The analysis of Axelrod and Keohane's dimensions of cooperation suggests that the shadow of the future can be lengthened not through ambitious declarations but through repeated, concrete interactions that build mutual knowledge and trust. The ASEAN minus X formula, which allows a willing subset of members to advance on a given issue while leaving the door open for others, offers one practical template. Minilateral coalitions of the willing, embedded within a broader plurilateral information-sharing framework, offer another.

One major limitation is that this paper has necessarily operated at a high level of abstraction in several of its sections. The price of non-coordination and the mathematical foundations of coordinative optimisation sketches the outlines of a model whose practical and empirical implementation remains a task for future work. So too does the empirical calibration of that model for specific regional contexts, the testing of its sensitivity to different assumptions about bargaining dynamics and institutional design, and the detailed examination of sector-specific coordination challenges in areas such as battery value chains, green hydrogen, or critical mineral processing. These are substantial research agendas, and this paper claims only to have laid some conceptual reflections.

Nevertheless, the era in which developing nations could afford to think about industrial policy exclusively through a national lens is over, if it was ever well-founded to begin with. The green industrial transition is a regional, and ultimately global, coordination problem. Solving it requires institutions that are modest enough to be credible, flexible enough to survive political turbulence, and analytically sophisticated enough to reveal the gains from coordination that individual national governments cannot see from where they stand. The model of coordinative optimisation developed in this paper is an attempt to learn from historical experiences to provide the theoretical scaffolding for such institutions, which challenges some of the dominant assumptions of regional integration theory.

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