

The Rate, Direction and Timing of European Industrial Policy: a Few Proposals

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Abstract

The paper provides a novel view on the challenges to the design of a European industrial policy. We overview the reasons for the recent come back in fashion of IP and we list a series of known facts concerning development, industrialization processes and industrial dynamics to derive the partial result that Europe needs a set of initiatives tailored to its specific position in the world economy. The strategies recently developed by the European Commission (Smart Specialization and Industrial Renaissance) identify the contours of a sound public intervention in the real economy and contribute to a deeper understanding of the technological trajectories that can influence European-wide patterns of specialization, entrepreneurial discovery and structural change. However, they maintain a rather conservative approach with respect to the desired rate, direction and timing of economic activities. In this sense, the paper sets forward a number of proposals to go beyond the simple relaxation of market constraints and bottlenecks, with the aim of contributing to a policy approach willing to “create markets”, to enable discovery and complementary initiatives from the private sector and to lift the economy out of potential traps. Such proposals concern Investment Banks, Public Procurement, European Public Enterprises and a possible European “Patrimony”. Finally, we suggest that the key to industrial upgrading in Europe passes through the public provision of those “specific inputs” that – for reasons of scale and failures in coordination – only the supranational Polity can supply.

It is hard to deny that every case of economic success in recent economic history is related to forms of policy intervention devoted to the development of industries (Salazar-Xirinachs *et al.*, 2014). Nonetheless, the debate on the relative costs and benefits of Industrial Policy (IP hereinafter) is usually polarized between supporters and critics, often mirroring the political divide that separates progressive and conservative worldviews. Moreover, while offering a set of tools available to any country irrespective of the position occupied relatively to the world technological and wealth frontier, IP and its related theoretical advances tend to be a developing countries’ (and development economics’) affair.

Even if IP has a clear developmental focus, one cannot disagree with Hausmann and Rodrik (2006) when they claim that everywhere policy makers are “doomed to choose”: industrial

policies play an important role both in catching up and leader countries, and the decision is not whether to intervene, but where and how to intervene. This paper takes stock of the most recent debates on IP and provides a framework not only to “re-import” IP discussion to developed countries, but also to extend its reach to the supranational dimension. In particular, the analysis derives a number of proposals to design a new industrial policy for the European Union, capable of contemplating the shortcomings of the existing approaches and the needed reforms at the community level. From another point of view, what the paper suggests is to make the idea of the “entrepreneurial state” (Mazzucato, 2013) and the “innovation state” (Rodrik, 2015) a supranational one, embracing the European Union as a whole.

The first take-home from the analysis is that the European dimension of IP is subject to a specific set of problems which requires a specific set of solutions. The focus on the extent and intensity of capabilities and know-how necessary to make industrial upgrading to work well is an issue relatively less important than the creation of the appropriate instruments capable of *i*) removing bottlenecks to Europe-wide investments, raising their returns, *ii*) creating enabling platforms for cumulative technological advancement and upgrading, *iii*) providing the critical mass of demand to make certain niches of research and production viable, *iv*) filling the gaps and the structural holes in the continental industrial network with direct public intervention – what in Mazzucato (2015) terms has to do with “actively creating markets, instead than just fixing them”. In a nutshell, a European IP has to focus not just on the rate of intervention, but also in its direction and timing, taking stock of the dynamics of its industries.

The second take-home from the paper regards the premises and the implications of implementing such proposals. The setup of a consistent European IP is inherently connected in a sort of “dual inducement” with the budgetary and governance dimension of the Union: advancements in the European institutional design affect the scope and the (economic and political) feasibility of the policies under consideration; the implementation – even partial – of some of the suggested industrial policies may represent a push for broader reforms. The existence of such mutual feedback does not necessarily lead to progresses in the integration process nor to superior outcomes, whose selection is mainly a political choice.

The paper proceeds as follows: Section one identifies the structural reasons for the current coming back into fashion of IP. Section two provides the general theoretical rationale for IP and describes the peculiarity of the European case. Section three reviews the current IP

strategies of the European Union. Section four derives a number of proposals to be implemented as building blocks of a new European industrial policy. Section five concludes.

1. Industrial Policy Matters, Once Again

There is a growing interest in the study and the practice of IP (Stiglitz *et al.*, 2013; Salazar-Xirinachs *et al.*, 2014); this is quite interesting phenomenon, given that “*There was a time when ‘industrial policies’, for both developed and developing countries, were bad words not to be spoken either in public or in private by respectable people*” (Cimoli *et al.*, 2009, p. 1). Such growing interest is particularly evident in the literature, where qualifying adjectives such as “new”, “rejuvenation”, “return to fashion” and “rethinking” are constantly matched to industrial policy (Warwick, 2013) to signal a novel wave of attention to the topic¹. Moreover, recently many high and medium income economies (among them France, Germany, Japan, Korea, The Netherlands, United Kingdom, Turkey, U.S., Brazil, China, India, Argentina, Colombia, Vietnam and Chile) have been engaged in either general, sector-specific or technology-related industry interventions (Warwick, 2013; O’Sullivan *et al.*, 2013). We can identify two main – related – explanations for the return of IP, one based on long-run arguments and the other based on short-run and more contemporary drivers.

The first view is rooted in the historical development of IP as experiencing a “rise, fall, and rise again” (Salazar-Xirinachs *et al.*, 2014). Such perspective considers the current interest in IP as consequence of the (roughly) natural cyclical succession of positions against and in favor of policy intervention. In this sense, the comeback of IP can be seen as a case of “shifting involvements” (Hirschman, 1982). From this perspective, a call to stronger and more pervasive IPs depends on the fact that the expected returns to study and adopt industrial policies are increasing after a period of disillusion and disenchantment in which market failures became more critical relatively to government failures. However, cyclical shifts in the evaluation of the essentiality of State intervention cannot be the only determinant of IP resurgence. The second explanation departs from a pure long term predictable pattern to highlight those several contingent factors which – at least for Europe – contribute to raise the

¹ The labeling of Industry and Innovation -related policies is even more diversified; see for example the German New High Tech Strategy *Industry 4.0* (<http://www.hightech-strategie.de/de/The-new-High-Tech-Strategy-390.php>).

importance of IP: *first*, the double-dip² crisis that European economies are still experiencing (UNIDO, 2014); *second*, the structural transformations of production activities; *third*, the secular trends of economic growth for developed countries; *fourth*, the competition with emerging economics. We analyze the four points below.

Concerning the first point, the European economy is still deeply rooted in the crisis (Majocchi, 2014). Over the last years, however, the political pressure generated by poor economic forecasts and the figures of mounting unemployment helped the convergence towards positions favorable to a supranational coordinated intervention in support of the real economy. Notwithstanding the debate on the size and scope of austerity measures, the consensus around public intervention is exemplified by the recent launch of the Investment Plan for Europe (Juncker Plan)³ and the related kick-off of the ESIF fund (Majocchi, 2015). The acknowledgment of the magnitude of capital structure destroyed by the crisis and the focus on the importance of manufacturing are already at the core of the European Commission IP strategy (see Section three for a more detailed discussion); in this sense, such point of departure for policy design already represents a step in the direction suggested by this paper.

Regarding the second issue, at least three different but related dynamics, and the need to govern them, make a qualitative leap in the extent and quality of IP necessary: *i*) the robotization and automation of economic tasks (Autor, 2014) that – in a creative destruction fashion – produce efficiency gains, re-shoring and resources reallocation but also jobs and wages polarization with some consequent detrimental welfare effects; *ii*) the emergence of factoryless producers (Bernard and Fort, 2013) as a transitory or permanent phenomenon, the international dispersion of production processes in global value chains (GVC), and the change in the shares of value added originating in Europe (Timmer *et al.*, 2014; Amador *et al.*, 2015); *iii*) the increasingly blurred boundaries between manufacturing and services as Fontagnè *et al.*

² With double-dip here is meant the “W” shape of the EU macroeconomic variables – in particular manufacturing output – trends (UNIDO, 2014), where a new recession has followed a small reprise in 2011. Interestingly enough, the “alphabet” of the European crisis, which passed from an expected “V” (a crisis with fast reply) via a “U” to the already mentioned “W”, seriously risks to bend towards an “L” shaped recession (Basu, 2014).

³ Communication of the European Commission COM(2014) 903 final “An Investment Plan for Europe” of 26.11.2014. The plan is structured around the European Structural Investment Funds (ESIF) and the Programme for Employment and Social Innovation (EaSI) microfinance. The ESIF fund, endowed with 21 Euros billions in guarantees coming from the European Union budget (16 Euros billions) and the European Investment Bank (5 Euros billions), is expected to produce a 15x leverage in order to finance projects for 315 Euros billions.

(2014) highlight when trying to draw the borders of what is meant by industry: “*The nature of industry is changing as industry and services are becoming one single entity. The boundaries of companies are changing with the splitting of value chains. The defining characteristic of an “industrial” company is its involvement in product design, intellectual property and economic risk. The defining characteristic of “industry” is mass production, economies of scale, productivity gains and the application of technical progress*” (Fontagnè *et al.*, 2014, p.4). This structural fusion between manufacture and services has to be seriously taken into account when implementing IP. The same call to attention holds for what concerns the evolution of value chains. As Amador *et al.* (2015) find out, there is a growing relevance of external suppliers in the Euro area – as important as it is for China and more than it is for U.S. or Japan – even if such embeddedness in GVC does not seem to undermine the magnitude of intra-European trade. Rather, it is domestic production to be substituted with international sourcing and linkages, a tendency at the core of the relative European de-industrialization problem that spurred most of the recent initiatives on IP (Dhéret, 2014).

Concerning the third point, the possibility that advanced economies are entering a phase of secular stagnation (Summers, 2013; Gordon, 2012) implies potentially severe consequences on the amount of public intervention needed to maintain the pre-crisis level of occupation, the balance of macroeconomic accounts, and so on. If the level of potential growth (so the attainable target for output growth) of the Western economies suffers from a permanent slump and has to be corrected downwards, then the need of a fine-tuned IP capable of facilitating and channeling investments is even stronger. The combination of the economic and financial crisis with processes of de-industrialization and the possibility of jumping on a path to secular stagnation creates the risk of that “never come back” situation experienced by Eastern Germany after reunification, which calls for sustained intervention in order to support investments (Kollatz-Ahnen and Bullman, 2014).

Finally, the fourth factor making IP an urgent matter of analysis and action has to do with the competition from emerging economic powers. Despite the dependency of good share of these economies on the availability of natural resources, many of them successfully applied IPs over the last years – entering advanced markets step by step, first by assembling imported goods and then conquering slices of the value chains, in a fashion similar to that predicted by the international product life cycle theory (Vernon, 1966). The competitive pressure coming

from these rising countries acts as an incentive to rationalize and enhance the developed world strategies in support of industrial development.

In sum, the literature is right in highlighting the “rise again” of industrial policy – at least as a theoretical priority –, especially as it takes place in the minds of the European policy-makers. The combined effect of the crisis’ push for reforms, the structural worldwide re-arrangement of production, the secular trends of economic growth for the developed economies, and the global competitive race for success – all happening on top of a period of shifting involvements toward more open views on government intervention – set up the optimal condition for IP to be at the core of economic policies. However, having a favorable climate for IP does not directly translate in an extended reach of IPs and, more important, in the implementation of the “right” policies. In order to be effective in the European context, IP has to be tailored to the needs of the European economy. The task of the next section is therefore to highlight some general stylized facts of IP and to combine them with other known facts about the dynamics of advanced economies, in order to identify which prescriptions hold for the European case.

2. What We Know about Industrial Policy and What is Relevant for the European Economy

It is a good practice to start with a definition of the object of analysis. We consider the most complete definition of IP the one elaborated by Warwick (2013, p. 16) on the basis of an extensive review of the literature: “*Industrial Policy is any type of intervention or government policy that attempts to improve the business environment or to alter the structure of economic activity toward sectors, technologies or tasks that are expected to offer better prospects for economic growth or societal welfare than would occur in the absence of such intervention*”. This definition can be maintained as a useful benchmark; however, for the purposes of the paper, our “working” definition is the one borrowed from Hausmann and Rodrik (2006, p. 24), who see IP as “*the provision of inputs that are specific to subsets of activities*”. Two building blocks from this definition are relevant for the construction of a European IP: *i)* with “*provision*” the focus is on the pro-active role played by public institutions, filling the gap when market provision is lacking; *ii)* *specific inputs* – so specific to require an external public intervention – are the key to differentiate the European case with respect to interventions in a developing context: the required specific inputs are relevant and purposeful know-how, missing links in the network of firms and industries interactions, financial resources, and

platforms that ease the matching of latent supply and demand. The proposals in Section four are indeed related to the provision of specific inputs to certain activities and build around this first definitional exercise.

To identify which specific proposals can be designed for the European Union, it is useful to briefly discuss what is well-known about industrial policy, in order to circumscribe the field of analysis. In fact, another reason not yet mentioned for the comeback of IP has to do with the very evolution of the economic discipline, and namely with the fact that nowadays we know more about the ingredients and effects of IP. In particular, over the decades, the broad confrontation between the supporters of balanced and unbalanced growth strategies (Hirschman 1958; Murphy *et al.*, 1989; Alacevich, 2011) has been enriched by the introduction of new microeconomic building blocks, developed in sub-fields of economic theory such development economics (Hoff, 2000; Sah and Stiglitz, 1988), structuralist, and Schumpeterian economics/industrial dynamics (Cimoli *et al.*, 2009, Cantner, 2011).

In general, any rationale for IP derives from the evaluation of the weight that society assigns to market failures compared to government failures. Government failures have to do with the peculiar payoff functions of the public agents (susceptible to the electoral cycle and to the maximization of power and influence rather than to economic welfare) – that is, with incentives that could be mismatched with respect to the aim of IP – and with information problems – i.e. with the uncertainty faced when trying to “pick winners”. Moreover, government intervention is usually blamed for its tendency to produce “crowding-out” of private propensities to invest, which are substituted rather than complemented by the State activities.

Market failures in the context of IP are instead determined by forms of externalities like coordination problems and spillovers (Hausmann and Rodrik, 2006). In coordination failures agents are not capable of fully internalize the effects of others’ decision, meaning to evaluate the social returns of an action instead of the private ones; spillovers – being them rent or knowledge ones (Verspagen and De Loo, 1999) – are unintended transfers of value (not captured by prices) or know-how (when not protected or easily absorbable). The presence of coordination problems and spillovers negatively affects incentives, and produces inferior outcomes and the probable selection of a low-level equilibrium, often turning into “traps” (Hoff, 2000). The role of IP is exactly that to correct such failures, being the “visible hand”

capable of lifting the economic system out of bad equilibria and to design institutional mechanisms (via direct intervention or contracts and insurances), helping (or forcing) agents to internalize externalities.

In order to work properly, IP has to rely on information about the functioning of the economic system. Such information cannot be complete – information asymmetries are pervasive and learning, which is nothing but knowledge accumulation, occurs also in public institutions – but can benefit from pieces of evidence that appear to be persistent between and within economies and over time. Such well-known regularities about a certain phenomenon are usually labeled in the literature “stylized facts” (Kaldor, 1961).

We discuss next some of those facts in the context of IP literature and with respect to studies on industrial dynamics (Dosi, 2007), aiming to select those issues that have to be seriously addressed in designing a European IP. Concerning IP, we mainly refer to Hausmann and Rodrik (2006) and Rodrik (2013 and in UN-DESA, 2007). In general, the following persistent regularities are found: *i*) developing countries produce less diversified and less sophisticated products *ii*) the manufacturing sector is conducive of growth and structural change (growth booms happen when economies shift to manufacture) *iii*) some specialization patterns are better than others in guaranteeing faster growth and *iv*) there is unconditional convergence (in labor productivity growth and levels) at the manufacturing and product level. In short, the main finding is that “what” is produced is fundamental. Growth is achieved by upgrading the set of products produced as well as their quality, in particular in the manufacturing sector. The manufacturing sector, in turn, represents the best platform for industrial take-off and the very locus of learning (Cimoli *et al.*, 2009), where growth-enhancing knowledge is accumulated, recombined, re-used (Bresnahan, 2012). Of particular interest is stylized fact *iv*, which is the key to identify the most relevant and ultimate target for IP. The patterns of convergence in economic performance and productivity in the recent years show the presence of “technology clubs” (Castellacci, 2008) as well as increasing divides; the macro evidence speaks generally in favor of the so-called conditional convergence, meaning that the countries’ growth rates show similar patterns only when country-specific conditions are controlled for. However, when the focus is shifted from the macro level to finer-grained levels of analysis, it appears clear that non-manufacturing activities drive countries divergence. Taken alone, manufacturing shows unconditional convergence, suggesting therefore that “*lack of convergence is due not so much to economy-wide misgovernance or endogenous technical*

change but to specific circumstances that influence the speed of industrial reallocation from nonconvergence to convergence activities. The policies that matter are those that bear directly on this reallocation.” (Rodrik, 2013, p. 38). Unconditional convergence holds at more disaggregated levels of analysis: at the product level, once a country starts to produce a certain good its productivity in making it good converges to the world frontier level. The reallocation of resources towards more advanced production is the key to (unconditional) growth.

Following the line of research just sketched it becomes once again clear that “what” is produced matters, because producing the “right” goods means to jump on the trajectory of growth and industrialization. The implication for the analysis of development is that the focus has to shift on what makes certain products viable for production – namely on what determines the size of the product space (Hidalgo *et al.*, 2007). Here the definition of IP as *the provision of inputs that are specific to subsets of activities* comes in: the specific inputs are in broad sense the *capabilities* – the know-how – needed to introduce goods in the basket of feasible production. In short, the task of IP is to supply or form the needed capabilities when these are lacking by intervening directly or by lifting the market forces out of low-equilibrium traps.

The stylized facts on development and IP highlight the provision of “missing inputs” as the key for diversification, sophistication, growth and convergence. The literature on industrial dynamics (Cantner, 2011) identifies another set of regularities, this time more tailored to developed countries. Without entering in details (see Dosi, 2007 for a survey), economists are aware of the statistical properties of firms growth, R&D expenditures (Cohen and Klepper, 1992), innovation (Silverberg, 2002), spinoff activities (Klepper, 2009), survival, market competition and selection (Cantner, 2007), agglomeration and collaboration (Cabral *et al.*, 2013), and evolution over time (Klepper, 1996). In a nutshell, the success or failure of businesses and industries is again dependent on “what” they do specifically: different industries have different knowledge basis, different propensity to innovate, to compete and to cluster geographically, different “elasticities” with respect to consumer final demand, and peculiar structures of connectivity and interdependency with upstream and downstream activities. Such heterogeneity evolves over time along with the life cycle of the different economic products and sectors, meaning that besides the rate and the direction also the *timing* of policy intervention matters. Even in these cases, market outcomes depend on the

availability and the quality of specific inputs: capabilities to do something and to eliminate the bottlenecks created by coordination failures and spillovers, while learning is continuously taking place (Stiglitz and Greenwald, 2014). Moreover, despite the tendency of the borders between manufacturing and services to become fuzzier (Fontagnè *et al.* 2014), also these known regularities of industrial development emerge from the manufacturing sector. Manufacturing is the locus of learning, where knowledge is formed and developed, where scale and cumulative improvements generate growth.

Comparing the stylized facts concerning IP in developing contexts and industrial dynamics, there is a clear commonality regarding the role played by specific capabilities as ultimate inputs for the supply of a largely diversified set of products and on the importance of manufacture as the sector where most of innovative activities, learning and change take place.⁴ However, when comparing the European case to other contexts in which IPs are applied, it also becomes clear how the set of problems to be addressed is different. The economies of the European Union – and in particular those of the Euro area – already developed strong manufacturing sectors and are – at least potentially – able to produce most of the products (in fact, within the European Union member countries trade among them similar products⁵). Despite a tendency to relative de-industrialization (Dhéret and Morosi, 2014), the basic set of capabilities needed as input for specific production activities are available to all the European countries, meaning that differences in diversification are negligible. Being already industrialized and endowed with a skilled labor force, the European economy is not at risk of “premature de-industrialization” (Rodrik, 2015a); moreover, its de-industrialization has to be understood mainly as “(low-skills) employment de-industrialization”, while value-added in manufacturing remains high. The differences in productivity can be explained as differences in specialization patterns (the relative weight of different industries in the economy) as well as by institutional and technological factors: even considering the tendency to unconditional convergence at the product level, the advanced economies participate in a continuous race to innovate and explore new industries – a force that works in favor of increasing divergence and heterogeneity in performances. Moreover, on

⁴ This awareness drives recent initiatives to favor the reshoring of manufacturing activities in advanced countries. See for example the strategy “Made in America” launched in the United States via the National Institute of Standards and Technology (NIST) – <http://www.nist.gov/mep/services/america/reshoring.cfm>.

⁵ Intra-industry trade (driven for example by product diversification) seems to be another stylized fact of industrial development. As highlighted by the EU Industrial Structure Report 2011 (http://ec.europa.eu/enterprise/policies/industrial-competitiveness/competitiveness-analysis/eu-industrial-structure/index_en.htm) “*there is a high share of exchange of similar goods between countries with comparable levels of income*”.

the demand side, wealthier (despite the crisis and notwithstanding the increasing inequality) and more sophisticated consumers also affect competition and the selection process of “fitter” firms (Cantner, 2007).

The European economy is affected by coordination failures and spillovers as any other economy. However, while the specific inputs that IP has to usually provide have to do with the formation of those capabilities, undersupplied due to market failures, that permits increasing diversification, in the already diversified European Union the IP has primarily to solve the coordination problems (and to internalize the spillovers) related to specialization and asynchronous industry dynamics. The main reason for that has to do with the fragmented nature of the European market and political constituency (Moro and Vannuccini, 2014) and with the potential lack of private demand for new industries as well as for the established ones that engage in innovative change. In sum, confronting the possibility to actively intervene in the economy, IP in Europe has to focus not only on the rate but also on the *direction and timing* of investments.

Having highlighted the European-specific rooms open for IP and the differences with respect to the areas of intervention identified by IP stylized facts, we review the current state-of-the-art of industrial policy at the European level.

3. The Current European Strategies

European institutions – and the European Commission in particular – tried in the last years to ride the wave of IP comeback, by setting up a broad continental strategy aimed at revamping the commitment of governments and stakeholders with respect to industrial growth. Such strategy – urgently necessary due to the economic crisis and the “gloomy prospects for European manufacturing industries” (Dhéret, 2014) – is composed by a large set of interrelated programs and initiatives. In what follows, we will focus on the two main pillars that represent a valuable starting point for the construction of a fully-fledged European IP: Smart Specialization strategy and Industrial Renaissance. Before describing them, however, we shortly overview the current tools used by the European Union to address the issue of industrial development.

The most comprehensive overview on Europe and IP is the study provided by the Industry, Research and Energy (ITRE) Committee of the European Parliament, titled “*EU industrial policy: Assessment of recent Developments and Recommendations for Future policies*” (European Parliament, 2015). The document nicely depicts the current attitude of the European institutions towards IP: on the one hand, it underlines the widespread renewed interest in industrial policy; on the other hand, it detects the deep uncertainty about IP definition and characterization, in particular for what concerns its implementation in Europe. Notwithstanding the still-in-the-making nature of European IP, the study offers a useful systematic analysis: it provides background figures on the (regional and country) distribution of several indicators – among them competitiveness, the dynamics of value added, GDP per capita, and R&D expenditures – (European Parliament, 2015, p. 12) in order to trace a picture of the current situation of the European economy. Besides such snapshot – which positions Europe as a whole among the world leaders in industrial development and at the same time uncovers wide within-Union disparities –, the study traces the historical evolution of European IP through five phases that mark the passage from a one-sector industrial policy with the European Coal and Steel Community to the Commission alternate activism in the Seventies, in the Nineties, and nowadays. More interestingly, the report summarizes and describes in details the programs that can be considered contributing to a European Industrial policy under the current institutional and budgetary framework. We reproduce them below.

Table 1. European initiatives related to industrial policy

EU Initiative	Budget (Euro)	Sub-initiative relevant for an EU Industrial Policy	Budget (Euro)	Theme	
Competitiveness for growth and jobs (EUR 125.6 billion, 13% of the Multiannual Financial Framework budget)	Horizon 2020	77 bln (56%)	KET (Key Enabling Technologies)	6.6 bln	Innovation
			SME Instrument	2.8 bln	SMEs/ICT
			Eurostars	287 mln	SMEs Internationalization
			Fast Track to innovation	200 mln	Research and Innovation
			SILC II	20 mln	Tech/non-tech innovation

			Energy infrastructure	5.1 bln	Energy connections - Single market
	Connecting Europe Facility	19,3 bln (15%)	Broadband infrastructure	1 bln	Digital connections - Single market
			Transport infrastructure	13.2 bln	Transport connections
			Access to finance	163 mln	Loan guarantee facility, equity financial instruments
	COSME	2 bln (2%)	Access to market	57 mln	Internationalization
			Framework conditions	34 mln	simplification measures
			Entrepreneurship	9 mln	Entrepreneurship
			Progress	497.1 mln	Employment
	EaSI	815 mln (1%)	EURES	146.7 mln	Employment services
			European Progress Microfinance Facility	1711. mln	Microfinance
Economic social and territorial cohesion (EUR 325.1 billion, 34% of the Multiannual Financial Framework budget)	Cohesion Policy	322 bln (99%)	ERDF	100 bln	Innovation, Res., Digital agenda, SME, low-carbon economy
			ESF	n.a.	Active labor market policies
			Cohesion fund	66.3 bln	Digital infrastructure, energy, transport infrastructure
Sustainable growth and Natural res. (EUR 373.2, 39% of the Multiannual Financial Framework budget)	Community Agriculture Policy (CAP) - Pillar II	84.9 bln (23%)	European Agricultural Fund for Rural Development (EAFRD)	84.9	Diversification and dev. of non-agricultural SMEs in rural area
	European Maritime Affairs and Fisheries	6.6 bln (2%)	European Maritime and Fisheries Fund (EMFF)	6.6 bln	Fishing industry - adaptation to changing conditions

Source: European Parliament (2015), p. 31

As results from Table 1, European policies affecting the industrial sectors are spread over a set of heterogeneous programs and initiatives, spanning from research and innovation to infrastructure and small and medium enterprises (SMEs), and belonging to different

Directorates-general (see European Parliament (2015) for details). In sum, and quoting the report, “*significant resources are mobilised by policies and programmes contributing to an “EU industrial policy”, and the policy coverage is extremely wide. Some of the initiatives with a budget envelope are (in order of importance): Cohesion Policy, Horizon 2020, Connecting Europe Facility and COSME, representing slightly less than €200 billion. Two recurring priorities across these programmes are SMEs and innovation. In addition, the EU exercises regulatory power in a number of areas, which contributes to levelling the playing field and facilitating business in Europe: competition, internal market, business environment, intellectual property rights, trade and energy*”. (European Parliament, 2015, p.7). Despite the wide policy coverage, the collection of initiatives classifiable under the rubric of IP seems to be fragmented and likely to generate policy overlapping and duplication.

Besides identifying the source of financing to support industry-related policies, the other requirement for a European IP is to discriminate between the possible targets for intervention. In this sense, the report provides an exploratory forecasting exercise that lists industries and areas of economic activity where policy intervention could be beneficial; among them are construction, upscaling of cars, steel, big data, 3D printing, clean production, advanced manufacturing, smart grids, energy efficiency, creative industries, logistics, smart cities, and integrated agriculture (European Parliament, 2015, p. 51). These “promising” and emerging fields compose a first outline of possible areas of intervention for a European IP, since they are market niches with prospective scope for improvement in economic relevance and pervasiveness (Cantner and Vannuccini, 2012). To complete the picture, the list of such target areas has to be complemented with the identification of the most conducive of growth and technological upgrading industries (in this sense, see the Industrial Renaissance strategy contribution below).

Given the state-of-the-art of the European initiatives directly or indirectly tangent to IP and a first screening of promising areas of intervention, we can now turn to overview the two main strategies designed to upgrade the European industrial base.

The concept of *Smart Specialization* (Foray, David and Hall, 2011) links, at the European level, regional and innovation policy, and addresses the issue of coordination failure in the specialization patterns already identified in Section two. Moreover, it provides a theoretical framework regarding the interaction between the already mentioned specialization patterns

and the dynamics of general and radical technological change – the broader techno-economic paradigm (Perez, 2010). Smart Specialization has been quickly adopted as a central strategic objective by the European Commission (Foray and Rainoldi, 2013). It builds upon (and stresses) at least three main building blocks: *i*) the role played by entrepreneurial (so “bottom-up”) discovery; *ii*) the horizontal distinction between regional heterogeneity in capabilities and opportunities, and *iii*) the vertical (hierarchical) interdependency of industries and technologies. While the first two dimensions point to the micro world of entrepreneurship, learning, and formation of specific and directed stocks of knowledge⁶, the third one recognizes the complexity of technical change and highlights the structural properties of an economic development based on few “engines of growth”, capable of introducing waves of co-invention in application sectors.

The main contribution of Smart Specialization to the industrial policy at the European level is that not all the productive regions can be “leaders” in innovative activities. R&D specialization has to follow both a process of non-planned discovery of local peculiar capabilities and a “smart” allocation of innovative efforts to broaden the set of applications for a core technology. In short and as an example, it will not be beneficial at the aggregate level if all European regions specialize and invest in science-based fundamental nanotechnology or ICT research. The suggested alternative is that each local context – each region – identifies the potential, feasible and rewarding applications of the core principle to its field of expertise (i.e. application of nanotechnologies to agriculture, or of ICT to tourism) and invests accordingly in innovative activities. The role of public policy, in this view, is to ease the process of entrepreneurial discovery as well to develop early warning indicators to understand when and where a Smart Specialization strategy is leading to poor results.

Smart Specialization represents an evolution of the standard thinking on IP because it shifts the analysis from a pure top-down style of analysis and proposals to a bottom-up one, focusing on the role played by learning and uncertainty in industrial development. Moreover, by addressing the failures in coordination related to continental specialization patters, the Smart Specialization strategy addresses exactly the peculiar problem facing the emerging European IP, as highlighted in Section two of this paper. Finally, the awareness of the heterogeneity of technology and of its effect on economic activities is also helpful to design

⁶ The theoretical inspiration for the principle of entrepreneurial discovery comes from development economics, and more precisely from Rodrik and Hausmann (2003) suggestion that in order to understand and induce economic development scholars have to adopt a perspective grounded on “learning what one is good at producing” (p. 605), so on a view of development as an endogenous process of *self-discovery*.

policies fitting more to the stylized fact of advanced industries evolution outlined earlier in our study. The reference to the theory of “General Purpose Technologies” (GPTs hereinafter; Bresnahan, 2010; Cantner and Vannuccini, 2012) is in this sense an important one. Smart Specialization clearly identifies “GPT networks” as the main technological avenue to be supported and developed in order to generate sustained growth in the European economy. Such theoretical advancement has also its drawbacks. In fact, the microeconomic conditions for the successful establishment of a new GPT require an understanding of the mechanisms leading to persistence and pervasiveness of certain technologies (Cantner and Vannuccini, 2012). On this point further clarity is needed, also from a theoretical point of view: a more informed perspective on GPTs and general technological change may help to refine and adjust the formulation of Smart Specialization and thus the design of a European IP.

In sum, Smart Specialization nicely addresses the technological dimension that a Europe-wide IP has to take into consideration, making it a useful building block for our analysis. Distinguishing between generic technical change and its specific application, and applying this more sophisticated view to regional growth strategies allow for very specific forms of intervention, aimed at solving the coordination failures in specialization.

The *Industrial Renaissance*⁷ (IR) strategy intervenes instead on the broader narrative of IP and represents the official position of the European Commission, progressively developed over the years through several Communications⁸. At the core of the Communication is once again the awareness that during the crisis not enough attention has been devoted to the real economy, despite the fact that it represents the engine of European growth. In this sense, IR calls for European re-industrialization by setting a target of 20 percent of the European GDP to be created by industrial production in 2020. Acknowledging that the concept of “industry” reaches far beyond the statistics of manufacturing output, and given that a strong industrial base is at the roots of a healthy “economic fabric”, IR sets the stage for a systematic view on industrial policy, identifying four key priority areas of intervention: *i*) the European single market, *ii*) industrial modernization, *iii*) small and medium enterprises (SME) and entrepreneurship, and *iv*) internationalization.

⁷ COM(2014) 14 final “For a European Industrial Renaissance” of 22.01.2014.

⁸ COM(2012) 582 final “A Stronger European Industry for Growth and Economic Recovery” of 10.10.2012; COM(2010) 614 final “An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage” of 28.10.2010; Commission Communication COM(2014) 25 final of 22.01.2014 “A vision for the internal market for industrial products” of 22.01.2014 (and the related Staff Working Document) as well as others related to the specific fields of intervention.

In particular, concerning point *i* – the European single market – the Commission stresses the completion and integration of networks (tangibles – energy and transport – and intangible – information and data – ones), the promotion of the internal market for industrial goods and services, and the efforts in favor of improved standardization, regulatory frameworks, and public administration efficiency. With industrial modernization (point *ii*) the innovation policy dimension is taken into account, combining efforts on advanced manufacturing, Key Enabling Technologies (KETs – a concept in fact quite similar to that of GPT), bio-based products, clean vehicles and vessels, sustainable construction and raw materials, smart grids as well as, more broadly, on the “upgrade” of skills required in a knowledge-based economy. Moreover, this branch of the IR strategy addresses the relevant issue of access – in terms of costs and availability and distribution – of inputs, in particular energy sources and raw materials. Also for what regards the pillars of the strategy dedicated to SME, entrepreneurship, internationalization and IPR regimes, the IR synthesizes the relevant areas of intervention. Interestingly enough, the background Staff Working Document accompanying the IR Communication⁹ also identifies with a satisficing degree of detail the industries in which Europe has a comparative advantage and that could be the specific target of a continental IP¹⁰ aiming to affect not only the rate, but also the broad direction of industrial upgrading.

To sum up, three main conclusions can be drawn from the analysis of the current approach of the European Union to IP. First, with the Smart Specialization strategy the Union has started to address the right set of problems that the European industry faces: continental specialization, learning and discovery, connection between broad technological trajectories and the specific directions of regional development. Second, many of the key initiatives identified by the IR to re-launch the European industry are already part of the set of actions the European Union is engaged in (as indicated in Table 1), thus reinforcing the impression that the main purpose of the IR is that of re-organizing existing tools around a clearer rationale and a consistent narrative. Third, what results from the overview of the existing and proposed initiatives is the fact that the European Commission preferred approach regarding industrial policy is one mostly focused on removing bottlenecks. Such objective can be

⁹ SWD(2014) 14/3 “State of the Industry, Sectoral overview and Implementation of the EU Industrial Policy.

¹⁰ The specific industries studied are Chemical, Automotive, Machinery (mechanical engineering), Forest-based industries, Steel, Non-ferrous metals, Textile, fashion and high-end, Defense, Space, Agri-food industries, Pharmaceuticals, Bio-Based Products, Cement, Ceramics, Glass, Construction, Tourism and – more broadly – the issues related to standards and standardization.

achieved by ameliorating the access to financial markets or by increasing the variety of and accessibility to basic resources – in a few words, by lowering the bar of the “threshold industrial activities” for which to take place is beneficial rather than costly. This approach often identifies the right targets but is confined among the actions that “fix” the markets rather than “create” them. In the context of a recessionary European economy such fixes may not be enough, and the fears of crowding-out are offset by the potential benefits of public intervention. Hence, next Section proposes some ideas to go beyond the current European perspective on IP.

4. Few Proposals for a Truly European Industrial Policy

Before turning to the proposals for the European IP, a clarification has to be made. A basic distinction between IPs – one around which much of the policy debate revolves – is that confronting horizontal (also defined as functional, or general) and vertical (also labeled sectoral, or selective) policies (Chang, 2011). While horizontal policies are supposed to be more systemic in nature – mirroring the idea of Rosenstein-Rodan and Nurske’s balanced growth and Big Push (Alacevich, 2011) –, vertical policies appear to be more discretionary, in the spirit of Hirschman unbalanced growth and linkages approach (Hirschman, 1958). However, as Chang (2011) suggests, this basic distinction is a false one (or at least one with less precise contours – as the confrontation between the just cited “early development theories” seems today much milder, see Alacevich (2011)), because any policy has a degree of selectivity. Even education and health related policies, usually conceived as general ones, still produce uneven and differential effects. Given the scarcity of resources (mainly financial ones, but also policy attention and foresight is a scarce resource to be allocated to alternative ends), policy-makers are in any case doomed to choose.

In this sense, regarding the European dimension of IP, we do not claim that a supranational IP has to be necessarily horizontal or vertical. In contrast, we aim at combining the needed narrative on a coherent and systemic supranational industrial policy – a need already embodied in the renaissance-based language of the European Commission’s Communications – with the principles already introduced by the literature on Smart Specialization, namely its focus on the combination of general purpose technological opportunities for industry upgrading, coupled with coordination in specialization at the regional level. What we suggest

is in short a network of interdependent tools, institutions, and actions capable to set the European economy on a trajectory of sustainable and sustained growth.

In what follows we list four proposals around which a truly European Industrial Policy can be constructed. All of them take into account the conceptual framework developed early on in the paper – meaning to provide a solution to the peculiar coordination problems affecting the European industry.

Proposal #1: A Federal System of Investment Banks

State Investment Banks (SIB) are increasingly taken as an example of successful intervention on the real economy (Mazzucato and Penna, 2015) for they combine the availability of resources, the flexibility to screen and select among a wide range of projects and a certain degree of independence – which translates in a lower risk to end up in “government failures”. The European Union already leads the race for the best practices in the field with the successful example of the European Investment Bank (EIB). However, the EIB is not the only institution of this kind in the old continent: some member states own a “development bank”¹¹. SIBs are already experiencing forms of coordination, at the European level¹² and at the global level¹³. The proposed initiative has to do once again with the solution of a coordination problem: European and national investment banks risk to produce duplication of investments, to undermine specialization, to finance overlapping projects scaled either at the local, national or supranational level. In contrast, by setting up a Federal System of Investment Banks – with the EIB as “umbrella institution” – duplications and redundancies in the financed projects could be reduced to enhance an efficient re-organization of production on a continental scale, and to generate a genuine European multiplier out of Europe-wide investments. By strongly involving the EIB, the investment plan launched by the European Commission¹⁴ already starts to take the issue into account, making a useful step in the direction of a coherent network of investment banks.

¹¹ The European “National Promotional Banks” are the *Caisse des dépôts et consignations* in France, the *Kreditanstalt für Wiederaufbau* in Germany, the *Cassa Depositati e Prestiti* in Italy, the *Bank Gospodarstwa Krajowego* in Poland, and the *Instituto de Crédito Oficial* in Spain.

¹² See for example the Marguerite Fund for Energy, Climate Change and Infrastructure which is sponsored by the European SIBs (<http://www.marguerite.com/>).

¹³ With the Long Term Investors Club (LTIC), whose members are the State Investment Banks of China, India, Japan, Morocco, Ontario and Quebec (Canada), Turkey, Russia, United Arab Emirates and more (www.ltlic.org).

¹⁴ C.f. footnote 2 on the Communication of the European Commission COM(2014) 903 final “An Investment Plan for Europe” of 26.11.2014.

Proposal #2: European Public Procurement

Public Procurement (PP) as demand-side policy is already one of the tools in the toolkit of current European initiatives affecting industries and firms. However, besides the mere existence of PP, what matters is its magnitude and direction. Of particular relevance is innovative procurement (Guerzoni and Raiteri, 2014). In fact, if one of the policy goals is that to accelerate the transition to (or the entry in) more technology-advanced industrial fields, then the coordination problem occurring in this case is one related to the availability of the necessary demand critical mass (Witt, 1997) and to “dual inducement” (Bresnahan and Trajtenberg, 1995). If private demand is not enough to provide the consumer base on top of which a new industry can grow and develop – especially during the economic slumps generated by the crisis and despite some limits and barriers (Uyarra, 2014) –, PP can fill with public resource the gap of expenditure from the private sector, hence generating crowding-in instead of the feared crowding-out effect. Moreover, the knowledge spillovers generated by advanced PP (Eliasson, 2010) produce cascades of effect in related and unrelated industries, opening new opportunities and rejuvenating mature technological trajectories. In short, and as highlighted by the literature on GPTs (Cantner and Vannuccini, 2012), PP can solve the coordination problem, lifting the economy to a higher level of expected investments and production. Recent research (Raiteri, 2014) has found on U.S. data that for some technologies to be subject to public procurement lead to an increase in their pervasiveness – so in their scope and applicability; pervasiveness is there measured using the “generality” of the patents (in terms of citations) of the technologies under PP purchase programs. In sum, the extensive use of European PP could work as a “coordination device” to orient technological specialization, and to support the growth of infant industries as well as the evolution of established ones.

Proposal #3: European Public Enterprises

The idea of starting enterprises owned by European institutions and acting on European-wide scale is not new and builds on experiences and evidence at the national level (Ruta, 1980). As for what concerns Public Procurement, the idea of instituting state-controlled firms is particular appealing in crisis and recession times, when the risk of crowding-out of the private initiative is lower given the lack of incentives and the higher risks of market exit. European

Public Enterprises could have the pros of *i)* creating employment, *ii)* potentially being organized around more forward looking management, so to be more prone and ready to invest, and *iii)* being established in high-tech field, contributing – as PP do – to the overall critical mass of demand for innovative and novel products that may otherwise remain confined in market niches. The role of big demanders (Bresnahan and Trajtenberg, 1995) has been often the key for the opening of wide technological and growth opportunities and European Public Enterprises may be one of the key to exploit even wider European opportunities for industrial transformation.

Proposal #4: The European Innovation Patrimony and the European Innovation Dividend

The last proposal has to do with the intergenerational dimension of IP and with the long term fruits of its investments. In a nutshell, while the fiscal policy debate revolves around the political feasibility of European public debt (through Eurobond, Union bonds, Euro-project-bonds and the like), IP has to address the use of the assets corresponding to European investments (including those financed with the supranational debt). Such assets represent a patrimony capable of producing returns over time that can be accumulated for future uses. The proposal draws on Iozzo's (2011) re-reading of James Meade ideas on social dividend as well as on the recent revival of the topic in Rodrik (2015b) "Innovation State". The basic idea is that public intervention and the respective public investments aimed at "creating markets" (Mazzucato, 2015) are to be initiated in the framework of the European IP, especially in new technologies and emerging knowledge-intensive industries; the resulting capital formation has to be accounted as a public asset out of which economic returns can be earned. Such public assets should constitute the basis of a Community-owned "innovation patrimony" composed by a set of technology-related sovereign funds. The creation of these sovereign funds and the ownership of fruitful technological capital will allow future generations to cope with uncertainty and will also be a virtuous way to deal with future possible lack of solidarity at the European level. As Norway and other governments created state funds to postpone the use of revenues obtained from "natural capital" to the next generations, the acquisition of technological capital and the knowledge generated by state intervention could endow sovereign funds with an innovation patrimony. The result will be a European innovation social dividend (Iozzo, 2011) to be widely redistributed.

5. Concluding Remarks

The paper provides a novel view on the challenges to the design of a European industrial policy. After an overview of the reasons for the recent come back in fashion of IP, we listed a series of known facts concerning development, industrialization processes and industrial dynamics, and we derived the partial result that Europe needs a set of initiatives tailored to its specific position in the world economy. The strategies recently developed by the European Commission (Smart Specialization and Industrial Renaissance) identify the contours of a sound public intervention in the real economy and contribute to a deeper understanding of the technological trajectories that can influence European-wide patterns of specialization, entrepreneurial discovery, and structural change. However, they maintain a rather conservative approach with respect to the desired rate, direction and timing of economic activities. In this sense, the paper sets forward a number of proposals to go beyond the simple relaxation of market constraints and bottlenecks, with the aim of contributing to a policy approach willing to “create markets”, to enable discovery and complementary initiatives from the private sector and to lift the economy out of potential traps. Such proposals concern Investment Banks, Public Procurement, European Public Enterprises and a possible European “Patrimony”. Given the awareness of the European vast availability of capabilities and know-how, we suggest that the key to industrial upgrading in Europe passes through the public provision of those “specific inputs” that – for reasons of scale and failures in coordination – only the supranational Polity can supply. The broad support for such view relies on the idea that in a moment of crisis and potential secular stagnation the fear of crowding-out is negligible with respect to the benefits of the crowding-in generated by public intervention. In this claim there is certainly a component of “shifting involvements” that may fade away in the future, but the challenges to the European economy are real and have to be addressed.

In conclusion, it is worth to recall that all the proposals suggested in the paper implicitly rely on some form of financing and – most importantly – transfer of sovereignty to the European level (Vannuccini, 2013). For example, the very idea of the European Innovation State has in its name the word “State”, despite the fact that the European Union is not yet a Federal State. The issue of own resources (the budget) necessary to finance – among the other things – a sound IP is currently one of the core topics in the debate on the future of the Union and the Eurozone¹⁵; therefore, policy proposals addressing industry and the real economy have to be

¹⁵ High level group on own resources – First assessment report of 17.12.2014

strongly tied to the political proposals for institutional reforms. In addition to that, also the current monetary policies play a role in determining the rate and direction of a European IP; Quantitative Easing can for example induce State initiatives as well as increase the risk of moral hazard between the European Central Bank and the member countries who may feel entitled to lower down their commitments.

A new Industrial Policy for the European Union that focuses on the provision of the necessary inputs for advanced industrial developments can be the source of a cascade of spillovers – a knowledge and technology multiplier (Eliasson, 2010) – capable of increasing the society's Welfare. Besides, it may play a more strategic role in the European integration process. If every radical and incremental step in the European construction has corresponded to the shift of the provision of a public good to the supranational level (Montani, 2008), than a common IP could be regarded as the European public good addressing the need for progresses in the real economy. Again using the concepts of unbalanced development theory (Hirschman, 1958), each newly introduced Europe-wide policy contributed to create disequilibrium in the institutional balance, to be resolved with political advances. Setting up some of the proposals suggested in this paper would certainly contribute to push the European Union towards a new disequilibrium and hence *induce* it on the path to institutional progresses – yielding in the end a social dividend reaching far beyond the borders of Industry.

6. References

- Alacevich, M. (2011). Early development economics debates revisited. *Journal of the History of Economic Thought*, 33(02), 145-171.
- Amador, J., Cappariello, R., & Stehrer, R. (2015). Global value chains: A view from the euro area. *European Central Bank Working Paper Series No. 1761* / March 2015.
- Autor, D. (2014). Polanyi's Paradox and the Shape of Employment Growth (No. w20485). *National Bureau of Economic Research*.
- Basu, K. (2014), The Fear of “L”, *Project Syndicate*, <http://www.project-syndicate.org/commentary/kaushik-basu-gets-inside-the-resistance-of-economists-and-policy-makers-to-innovative-thinking>.

- Bernard, A. B., & Fort, T. C. (2013). Factoryless goods producers in the US (No. w19396). *National Bureau of Economic Research*.
- Bresnahan, T. F. (2012). Generality, Recombination, and Reuse, in *The Rate and Direction of Inventive Activity Revisited* (pp. 611-656). University of Chicago Press.
- Bresnahan, T. F. (2010), General purpose technologies, in: Hall, b., Rosenberg, N. (eds.), *Handbook of the Economics of Innovation 2*, North Holland, 2010, 761–791.
- Bresnahan, T., Trajtenberg, M. (1995), General purpose technologies "Engines of growth?", *Journal of Econometrics* 65(1), 83–108.
- Cabral, L., Wang, Z., & Xu, D. Y. (2013). Competitors, complementors, parents and places: Explaining regional agglomeration in the US auto industry (No. w18973). *National Bureau of Economic Research*.
- Cantner, U. (2007). Firms' differential innovative success and market dynamics. *Jena Economic Research Paper*, (2007-078).
- Cantner, U. (2011). Industrial dynamics and evolution—the role of innovation, competences and learning, in *Competition Policy and the Economic Approach: Foundations and Limitations*.
- Cantner, U. and Vannuccini, S. (2012). A New View of General Purpose Technologies, *Jena Economic Research Papers* **2012**, 054.
- Castellacci, F. (2008). Technology clubs, technology gaps and growth trajectories. *Structural Change and Economic Dynamics*, 19(4), 301-314.
- Chang, H. J. (2011). Industrial policy: can we go beyond an unproductive confrontation?, in *Annual World Bank Conference on Development Economics* (pp. 83-109).
- Cimoli, M., Dosi, G., & Stiglitz, J. E. (2009). *Industrial policy and development: The political economy of capabilities accumulation*. Oxford University Press.
- Cohen, W. M., & Klepper, S. (1992). The anatomy of industry R&D intensity distributions. *The American Economic Review*, 773-799.
- Dhéret, C. (2014). *Sharing the same vision – The cornerstone of a new industrial policy for Europe*, EPC Discussion Paper, 20 March 2014.
- Dhéret, C. and Morosi, M. (2014). *Towards a New Industrial Policy for Europe*, EPC Issue Paper n.78, November 2014.
- Dosi, G. (2007). Statistical Regularities in the Evolution of Industries. A Guide through some Evidence and Challenges for the Theory, in *Perspectives on innovation*, 153-186.
- Eliasson, G. (2010). *Advanced public procurement as industrial policy: The Aircraft Industry as a Technical University* (Vol. 34). Springer Science & Business Media.

- European Parliament (2015). EU industrial policy: Assessment of recent Developments and Recommendations for Future policies, on behalf of DG for Internal Policies - Policy Department A Economic and Scientific Policy - study for the ITRE Committee.
- Fontagné, L., Mohnen, P., & Wolff, G. (2014). No industry, no future?, *French Council of economic Analysis Note*.
- Foray, D., David, P. A. & Bronwyn, H. (2011). Smart specialization, *OECD working papers*.
- Foray, D., David, P.A., and Hall, B. (2009). Smart Specialisation – the concept, *Knowledge Economists Policy Brief No. 9*.
- Foray, D., Goenaga, X. (2013). The goals of Smart Specialisation, *Joint Research Centre – Institute for Prospective Technological Studies*.
- Foray, D., Rainoldi, A. (2013). Smart Specialisation programmes and implementation, *Joint Research Centre – Institute for Prospective Technological Studies*.
- Gordon, R. J. (2012). Is US economic growth over? Faltering innovation confronts the six headwinds (No. w18315). *National Bureau of Economic Research*.
- Guerzoni, M., & Raiteri, E. (2014). Demand-side vs. supply-side technology policies: Hidden treatment and new empirical evidence on the policy mix. *Research Policy*.
- Hausmann, R., & Rodrik, D. (2003). Economic development as self-discovery. *Journal of development Economics*, 72(2), 603-633.
- Hausmann, R., & Rodrik, D. (2006). Doomed to choose: Industrial policy as predicament. *John F. Kennedy School of Government Working Paper*.
- Hidalgo, C. A., Klinger, B., Barabási, A. L., & Hausmann, R. (2007). The product space conditions the development of nations. *Science*, 317(5837), 482-487.
- Hirschman, A. O. (1958). *The strategy of economic development* (Vol. 58). New Haven: Yale University Press.
- Hirschman, A. O. (1982). *Shifting involvements: private interest and public action*. Princeton University Press.
- Hoff, K. (2000). Beyond Rosenstein-Rodan: the modern theory of coordination problems in development, in *Proceedings of the Annual World Bank Conference on Development Economics* (pp. 145-188).
- Iozzo, A. (2011). Meade's Social Dividend: from Debt to Public Patrimony, *The Federalist Debate* XXVI(3).
- Kaldor, N. (1961). *Capital accumulation and economic growth* (pp. 177-222). Macmillan.
- Kollatz-Ahnen, M. and Bullman, U. (2014). Industrial and investment policy - what a well-structured package can achieve, *FEPS Policy Briefs*.

- Klepper, S. (2009). Spinoffs: A review and synthesis. *European Management Review*, 6(3), 159-171.
- Majocchi, A. (2015). The Juncker Plan: a Turning Point, but not Enough, *CSF Comments* n. 47, 3 February 2015
- Majocchi, A. (2014). L'Europa dello Sviluppo e dell'Occupazione, *CSF Comments* n. 32, 13 May 2014
- Mazzucato, M. (2013). *The entrepreneurial state: Debunking public vs. private sector myths*. Anthem Press.
- Mazzucato, M. (2015). Building the Entrepreneurial State: A New Framework for Envisioning and Evaluating a Mission-oriented Public Sector. *Levy Economics Institute of Bard College Working Paper*, (824).
- Mazzucato, M., & Penna, C. C. (Eds.). (2015). *Mission-Oriented Finance for Innovation: New Ideas for Investment-Led Growth*. Pickering & Chatto Publishers.
- Montani, G. (2008). *L'economia politica dell'integrazione europea. Evoluzione di una democrazia sovranazionale*, UTET De Agostini, Novara.
- Moro, D. and Vannuccini, S. (2014). *Il Governo di un'Economia Federale Sovranazionale e le sue Istituzioni nell'Esperienza Europea – Antologia di Contributi* (eds), CEDAM, Padova.
- Murphy, K. M., Shleifer, A., & Vishny, R. W. (1989). Industrialization and the Big Push. *The Journal of Political Economy*, 97(5), 1003-1026.
- O'Sullivan, E., Andreoni, A., López-Gómez, C., & Gregory, M. (2013). What is new in the new industrial policy? A manufacturing systems perspective. *Oxford Review of Economic Policy*, 29(2), 432-462.
- Perez, C. (2010). Technological revolutions and techno-economic paradigms. *Cambridge journal of economics*, 34(1), 185-202.
- Pianta M. (2014), *An industrial policy for Europe*, Seoul Journal of Economics, 27, 3, 2014.
- Raiteri, E. (2014). *The Impact of Innovative Public Procurement on Technological Generality: a Patent Data Analysis*, paper presented at the 15th Conference of the International Schumpeter Society, Jena.
- Rodrik, D. (2013). Unconditional Convergence in Manufacturing. *The Quarterly Journal of Economics*, 128(1), 165-204.
- Rodrik, D. (2015a). *Premature Deindustrialization* (No. w20935). National Bureau of Economic Research.

- Rodrik, D. (2015b). From Welfare State to Innovation State, *Project Syndicate*, <http://www.project-syndicate.org/commentary/labor-saving-technology-by-dani-rodrik-2015-01>.
- Ruta, G. (1980). Impresa pubblica ed integrazione europea, in Lavoro e occupazione nella prospettiva dell'Unione Economica e Monetaria Europea. Movimento Europeo – Consiglio Italiano, Franco Angeli.
- Sah, R. K., & Stiglitz, J. E. (1988). Sources of technological divergence between developed and less developed economies, in *Debt, stabilization and development*, edited by Guillermo Calvo, Ronald Findlay, Pentti Kouri and Jorge B. de Macedo, 423-446.
- Salazar-Xirinachs, J. M., Nübler, I., & Kozul-Wright, R. (2014). *Transforming Economies: Making industrial policy work for growth, jobs and development*. Geneva, ILO/UNCTAD.
- Silverberg, G. (2002). The discrete charm of the bourgeoisie: quantum and continuous perspectives on innovation and growth. *Research Policy*, 31(8), 1275-1289.
- Stiglitz, J. E., & Greenwald, B. C. (2014). *Creating a learning society: a new approach to growth, development, and social progress*. Columbia University Press.
- Stiglitz, J. E., Lin, J. Y., & Monga, C. (2013). The rejuvenation of industrial policy. *World Bank Policy Research Working Paper*, (6628).
- Summers, Lawrence, 2013. “Why Stagnation Might Prove to be the New Normal.” *The Financial Times* (15 December 2013).
- Timmer, M. P., Erumban, A. A., Los, B., Stehrer, R., & de Vries, G. J. (2014). Slicing up global value chains. *The Journal of Economic Perspectives*, 99-118.
- UN-DESA (2007), *Industrial Development for the 21st Century: Sustainable Development Perspectives*. United Nations Publications.
- UNIDO (2014), *World Manufacturing Production Reports*, Quarters 3/4- 2014.
- Uyarra, E., Edler, J., Garcia-Estevéz, J., Georghiou, L., & Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. *Technovation*, 34(10), 631-645.
- Vannuccini, S. (2013). *Expectations About Expectations: Auspicabili Effetti di un Piano Europeo di Sviluppo Sostenibile*, in Bordino G., Un nuovo diritto per la democrazia e lo sviluppo in Europa – l’Iniziativa dei cittadini europei (ICE), il Mulino, Bologna, 2013, 141-149.
- Vernon, R. (1966). International investment and international trade in the product cycle. *The quarterly journal of economics*, 190-207.

Verspagen, B., & De Loo, I. (1999). Technology spillovers between sectors. *Technological Forecasting and Social Change*, 60(3), 215-235.

Warwick, K. (2013), “Beyond Industrial Policy: Emerging Issues and New Trends”, *OECD Science, Technology and Industry Policy Papers*, No. 2, OECD Publishing. <http://dx.doi.org/10.1787/5k4869clw0xp-en>