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Beyond Industrial Policy

EMERGING ISSUES AND NEW TRENDS

Ken Warwick

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FOREWORD

This paper was developed as part of a project on the evaluation of industrial policy under the auspices of the OECD's Committee on Industry, Innovation and Entrepreneurship. The paper builds on an unpublished CIIE study written by Koen de Backer, Alistair Nolan and Dirk Pilat and also draws on contributions and insights from internal papers written by Andrea Beltramello, Chiara Criscuolo, Koen de Backer, Alistair Nolan and Dirk Pilat. Sarah Ferguson and Florence Hourtouat provided secretarial support. The author is particularly grateful to Antonio Andreoni and Dirk Pilat for comments on an earlier draft of the paper, as well as to delegates to the CIIE and participants in workshop discussions in Paris, Riga, Seoul and Warsaw for their insights.

ABSTRACT

This paper reviews the evidence on emerging thinking and new trends in the sphere of industrial policy. The paper adopts a broad and inclusive definition of industrial policy, and proposes a new typology based on the orientation of policy and the policy domain. Looking at a typology according to the policy domain, the paper proposes a framework based on growth accounting, which parallels the evolution of thinking about the rationale for industrial policy interventions, which has moved from a traditional approach based largely on product market interventions (production subsidies, state ownership, tariff protection), through market failure-correcting taxes and subsidies operating mainly on factor markets (R&D incentives, training subsidies, investment allowances, help with access to finance) to a focus on interventions that help build systems, create networks, develop institutions and align strategic priorities.

Recent developments in both the theory and practice of industrial policy suggest that it is possible to find a theoretical rationale for a government role. However, there are important practical difficulties, not least the risk of government failure, the risk of rent-seeking behaviour and the potential use of industrial policies for protectionist goals. Unless these problems are addressed, traditional approaches to industrial policy seem destined to fail, and the historical record has not been kind. 'Horizontal' measures are still the preferred way forward but there may be some aspects of policy where strategic choices need to be made. The risks associated with selective-strategic industrial policy can be minimised through a 'soft' form of industrial policy, based on a more facilitative, co-ordinating role for government, consistent with the systems approach described in this paper. While not immune to the dangers of government failure, such an approach, if carefully designed and implemented, has a much higher chance of success than the costly and distortionary selective-defensive industrial policy interventions of the past. One clear message to emerge from the paper is the need for much better monitoring and evaluation of industrial policy initiatives.

RÉSUMÉ

Le propos est de passer en revue les théories naissantes et les nouvelles tendances de la politique industrielle. À partir d'une définition très large et générale, les auteurs proposent une typologie par orientation et par domaine d'intervention. S'agissant de la typologie par domaine, ils présentent un cadre de quantification comptable de la croissance, qui fait écho à l'évolution des fondements conceptuels de l'intervention de l'État : à la démarche traditionnellement axée sur les marchés de produits (subventions à la production, présence capitalistique de l'État, protection tarifaire) ont succédé les taxes destinées à corriger les défaillances des marchés et les subventions agissant principalement sur les marchés de facteurs (incitations en faveur de la R-D, primes à la formation, abattement pour investissement, facilité d'accès au financement), tandis qu'à présent, les interventions tendent à contribuer à la mise en place de systèmes, à l'édification de réseaux, au développement des institutions et à l'harmonisation des priorités stratégiques.

L'évolution récente des politiques industrielles sur les plans théorique et pratique donne à penser qu'il est possible de justifier le rôle des pouvoirs publics du point de vue conceptuel. De grands risques n'en demeurent pas moins dans la pratique, en premier lieu celui de voir l'échec des pouvoirs publics, l'apparition de comportements de recherche de rente et le recours aux politiques industrielles à des fins protectionnistes. Tant qu'il n'y aura pas été remédié, les stratégies traditionnelles de politique industrielle seront manifestement vouées à l'échec, l'expérience passée ne laissant guère de place à l'optimisme. Les mesures « horizontales » restent la solution préférée, mais il arrive que certaines composantes de l'action des pouvoirs publics exigent des choix stratégiques. Lorsque la politique industrielle est à la fois stratégique et sélective, il est possible de réduire au mini mum les risques connexes en empruntant une voie modérée, où l'État a plus un rôle d'intermédiaire et de coordination, dans l'esprit de l'approche des systèmes décrite par les auteurs. Sans faire disparaître le risque d'échec, cette solution, pour peu qu'elle soit conçue et exécutée avec soin, présente des chances de succès nettement plus grandes que les politiques industrielles sélectives et défensives du passé, coûteuses et à l'origine de distorsions. L'un des messages qui ressort clairement de ce document est qu'il est nécessaire d'améliorer de façon notable le suivi et l'évaluation des initiatives de politique industrielle.

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BEYOND INDUSTRIAL POLICY – EMERGING ISSUES AND NEW TRENDS

Ken Warwick

1. Introduction

Following the economic and financial crisis of 2008-09, policy makers are looking for new sources of economic growth and employment creation. Some countries are concerned that their economic growth trajectory has not been sufficiently balanced, with some sectors declining excessively and others taking too strong a role in overall economic growth. In other countries, there are concerns that manufacturing production has declined too much, and that knowledge and capabilities have been irreversibly lost. And in some cases, there is a call for industrial policies to strengthen specific sectors, technologies or areas of economic activity, such as advanced manufacturing, knowledge-intensive business services or the 'green' economy, with the aim of fostering new sources of economic growth.

The increased interest in 'industrial policies', broadly defined, comes at a time when global value chains have become more complex and more important, and when competition from emerging economies is growing, even in activities and markets that were, until recently, considered the core strengths of OECD countries.

At the same time, many governments still face serious budget constraints following the economic crisis, and are seeking more effective and often more selective and low-cost policy interventions that can help strengthen their economy. Establishing priorities in areas where government action can make a difference is therefore of growing policy interest, and is evident, for example, in the debate in the European Union on 'smart specialisation'.[1] But how and where to act remains a difficult question and the historical experience with targeted interventions and industrial policies is mixed at best.

The first section of this working paper summarises key elements of the debate on industrial policies and industrial strategy. It looks beyond 'industrial policy' (and the controversies that surround the use of the phrase) and examines the upsurge in interest in new forms of industrial policy in OECD countries, which to some extent converges with the latest thinking on industrial policy from the development literature. The next section gives further background on the emergence of new industrial policy initiatives and discusses the reasons for the resurgence of interest. Section 3 discusses concerns about growth and the (relative) decline of manufacturing and how they play into the debate. Section 4 reviews the wide range of definitions of industrial policy and proposes the adoption of a new, broadly based definition. Section 5 discusses possible rationales for industrial policy and their evolution over time, but also sets out the practical arguments against industrial policy, in terms of government failure and incentives for rent-seeking.

The heart of the paper is Section 6, which sets out a new typology for industrial policy based on the policy domain and policy orientation. Examples of industrial policy in practice are briefly reviewed against the new typology and some pointers for future evaluation are identified. Section 7 reviews the early experience with new industrial policy in practice in four areas – clusters policy, investment promotion, public procurement and green growth. Section 8 discusses some general lessons and the need for more evaluation while the final section sets out some concluding observations and identifies some pointers for further work.

2. Background – new industrial policy initiatives

The evidence for a 'renaissance' of interest in new industrial policy can be found in the flurry of recent literature, research programmes, popular comment and government initiatives. In the development literature, the interest in new industrial policy goes back more than a decade. The World Bank has been actively researching in the area for some time, for example Rodrik's (2008) work for the World Bank on "normalising" industrial policy and Yusuf's (2012) consideration of the experience of East Asia and its applicability elsewhere. Lessons from Asia have also been studied by the Washington-based Petersen Institute's Noland and Pack (2003, 2005) while in Tokyo, RIETI (2011) have launched a programme of basic research for a new industrial policy. In Brussels, writing for the Bruegel think tank, Aghion, Boulanger and Cohen (2011) have been "rethinking industrial policy", as has UNCTAD in Geneva (Haque, 2007), while elsewhere in the UN system, WIDER has been researching "new challenges for industrial policy" (Naudé, 2010b). The Economist (2010) ran a headline "Industrial Policy is Back in Fashion" and Ciuriak (2011) titled his recent survey the "Return of Industrial Policy".

Examples of national initiatives

A number of OECD countries have also launched industrial policy initiatives in recent years, some in direct response to the economic and financial crisis and some with a longer-term focus:

- In France, the recent revival of industrial policy dates back to Beffa (2005) who recommended the creation of a new innovation agency and the mobilising of funding for five main areas: energy, transport, environment, health and information technology. This was followed in 2008 by the establishment of the Strategic Investment Fund, investing in growth businesses and supporting supply chains, and the Grand Loan, a EUR 35 billion loan to support forward-looking strategic investments and help position France strongly after the recession, The focus was on commercial spin-offs from universities and research institutes and support for priority sectors including: digital economy, nano- and bio-technology, renewable energy, low carbon vehicles and innovative SMEs.

- Japan has recently outlined a new industrial policy plan (METI, 2010) targeting a deliberate movement away from a 'monopole' structure based on automobiles and electronics to a structure based on five strategic areas: infrastructure-related and infrastructure system exports; environmental/energy problem-solving industries (including green vehicles); culture (fashion, food & tourism); medical and healthcare; and advanced areas traditional to Japan (robotics, space, aerospace).

- Korea, a traditional proponent of active industrial policy, has recently developed sector-specific strategies for those sectors it considers to be its flagship industries: automobiles, shipbuilding, semiconductors, steel, general machines, textiles and parts and materials. In addition Korea has also set out a number of priority growth engines for the future. Based on an analysis of where it believes its comparative advantage lies, Korea identifies 17 such sectors under three headings: green tech, high-tech convergence technology and value-added services (Ministry of Knowledge Economy, 2011).

- The Netherlands introduced its Top Sectors initiative following the country's 2010 general election. The newly created Ministry of Economic Affairs, Agriculture and Innovation (2011) set out a new enterprise and innovation policy, which introduced a sector approach with a cohesive policy agenda across government policy for nine 'top sectors': water, food, horticulture, high tech, life sciences, chemicals, energy, logistics and creative industries. These were identified as

sectors in which the Netherland excels and which the Government has set as a priority. Another area of focus is head offices and associated services.

- At the end of 2010, Turkey adopted its Industrial Strategy for 2011-14, aimed at boosting the competitiveness and efficiency of Turkish industry, increasing export market share, and focusing more on high-tech products and high value-added production. The strategy is accompanied by sectoral strategies for specific industries, including chemicals; ceramics; iron, steel and non ferrous metals; electrical and electronics; textiles, garments and leather; pharmaceuticals; and recycling.

- Until recently, the United Kingdom did not explicitly embrace a formal industrial policy. However, first in *New Industry, New Jobs* (BERR, 2009b) and then *The Plan for Growth* (BIS and HM Treasury, 2011), successive governments have set out visions for the economy's recovery which include both horizontal measures and the identification of key sectors where work will be undertaken to address barriers to growth. Under the Labour Government, a Strategic Investment Fund (SIF) was set up in 2009 to support a range of targeted investments across the UK economy intended to strengthen its capacity for innovation, job creation and growth, including support for low carbon technologies, advanced manufacturing, digital infrastructure and export promotion (BIS, 2009). Although the SIF was not continued by the Coalition Government, which took office in 2010, the new Secretary of State for Business, Innovation and Skills recently made clear his support for "a proper industrial policy" (Cable, 2012a) and set out his industrial strategy in September 2012 (BIS, 2012; Cable, 2012b).

- The United States does not have a formal industrial policy but the recently launched innovation strategy (National Economic Council *et al*, 2011) includes classic horizontal measures such as improving ICT infrastructure, education, and public services together with a number of vertical priorities, in particular: clean energy technologies, biotechnology, nanotechnology, space and advanced manufacturing. In addition, the *American Recovery and Reinvestment Act* of 2009 included support for energy technologies, housing and other sectoral measures in addition to horizontal and demand stimulus measures. Owen (2012) also points to the support given to two of the country's largest car manufacturers as an example of government industrial policy in action (see also Rattner, 2010).

- In Brazil, the launch of *Plano Brasil Maior* in August 2011 was aimed at increasing productivity and countering the recent decline in the industrial sector's contribution to the economy. The Plan put innovation at the centre of industrial policy and made significant changes to the innovation support framework, including making the National Economic and Social Development Bank (BNDES) responsible for financing innovation and investment. It also includes tax breaks for four labour-intensive industries – clothing, footwear, furniture and software – funded partly through taxes on general business turnover.

- The latest phase in industrial policy in China is set out in the country's 12th Five-Year Plan. The Plan for Science and Technology Development, launched in July 2011, targeted 11 essential sectors including ICT equipment, energy technology, genetically modified foods, pollution technology, pharmaceuticals and civilian aerospace. In July 2012, the Plan for National Strategic Emerging Industries was published, identifying seven strategic emerging industries and 20 key projects, together with policy measures to facilitate the development of the relevant industries. Under the Plan, the GDP share of the strategic emerging industries is targeted to rise by 8 percentage points by 2015 and by 15 percentage points by 2020.

- In India, the Department of Industrial Policy and Promotion (DIPP) published a National Manufacturing Policy in November 2011, targeting an increase in the share of manufacturing value added in GDP from the current 16% to 25% by 2022. At its core is the planned creation of national investment and manufacturing zones (NIMZs), which will enjoy planning exemptions and fiscal incentives and be developed as autonomous self-governing townships in partnership with the private sector. The DIPP also aims to make India a location of choice for foreign direct investment and to increase India's share of global inward FDI from 1.3% in 2007 to 5% in 10 years time.

Brazil, China and India are not the only non-OECD countries developing national strategies for science, technology and industry as part of their longer-term economic development strategies. Middle-income and developing countries such as Argentina, Colombia and Vietnam are developing strategies to diversify their economies and mobilise innovation to improve their competitiveness. Another example of a country focusing on improving the quality of the business environment and moving up the value chain in order to gain competitive advantage is Chile's new National Innovation Strategy for Competitiveness.

Some reasons for rising interest in new industrial policy

Several reasons can be identified for this widespread resurgence of interest in industrial policy and the search for a new paradigm 'beyond industrial policy':

- For some countries, the main driver has been the response to the 2008-09 economic and financial crisis. Faced with recession and the prospect of prolonged stagnation, policy makers saw an urgent need to boost growth, not just through demand stimulus but also through improvements to the supply side, including infrastructure provision, support for technology and measures to help firms and sectors that had been particularly adversely affected (for example, help for SMEs or for the automotive sector). Moreover, at a time of unemployed resources, one of the arguments against industrial policy – namely that investing in particular sectors of the economy would simply lead to displacement in other sectors – appeared to carry less weight.
- Second, the crisis led to some questioning of the extent to which market mechanisms, and in particular the flow of finance, would lead to investment occurring in the 'right' sectors and restore the economy to its trend growth path.
- A third possible reason is that the emergency use of bail-out funding for the financial sector can provoke calls for more intervention elsewhere. While the analytical arguments for bailing out the financial sector are conceptually quite distinct from those that might be made for other industries, the political economy arguments are nevertheless potent. Moreover, industrial policy responses aimed at addressing problems that are temporary and specific to the recession can create demonstration effects and/or demands for assistance to be extended to other sectors.
- Fourth, many governments saw the crisis as revealing structural imbalances in their economies that needed to be corrected. So, countries adopted strategies that explicitly targeted improvements in the regional balance, in the balance between domestic demand and external demand and in the balance between sectors. Typically, it led countries to seek to rely less on the financial services sector and more on advanced manufacturing and on low carbon technology and other areas of new technology.
- Finally, some OECD countries are responding to the apparently successful policies of fast-growing economies, notably China, and the challenge they may pose to competitiveness, not just in lower value-adding activities but at other points in the global value chain as well. The resurgence of developing country interest in industrial policy generally pre-dates the economic

and financial crisis and is arguably an independent factor driving the search for a new paradigm in OECD countries.

Concerns about structural imbalances and the competitive challenge to OECD countries from emerging economies are considered in more detail in the next section, which also discusses the question of whether manufacturing – by reason of its contribution to R&D, exports and productivity and its linkages to other sectors and activities – is a strategic sector of systemic importance over and above its contribution to GDP and employment.

3. Setting the scene – concerns about growth and the declining share of manufacturing

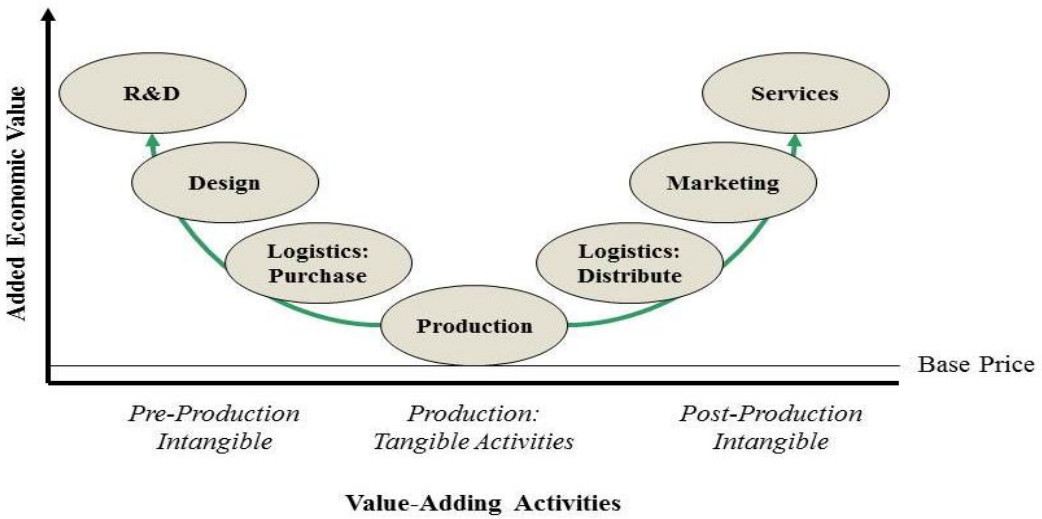
In the aftermath of the recent economic crisis, governments in OECD countries and beyond are looking for ways to strengthen potential output growth, often in a context of heavily constrained public finances. The search for new sources of growth also comes at a time when many countries face increasing demographic pressures. Future growth must therefore increasingly come from innovation-induced productivity growth, including investment in intangible assets, and from tapping into new or unmet demands, such as the demand for green growth.

In several countries, the debate extends to the specific sectors and growth areas that might be able to provide new areas of economic growth. One of these is manufacturing. Manufacturing's share in GDP and employment in OECD countries has been declining for several decades, due to a number of factors (Pilat, *et al*, 2006), including:

- Saturated demand for manufacturing products, in particular in the OECD area.
- Relatively rapid productivity growth in the manufacturing sector, implying that despite growth in real manufacturing output and value added, less employment is needed to produce more value.
- A blurring of manufacturing with services, where manufacturing firms increasingly capture value in the associated services they provide rather than manufacturing production. This also implies that certain firms initially classified as manufacturing firms are now classified as services firms.
- A growing internationalisation of manufacturing production.

The last two of these trends also influence the position that firms seek to occupy in global value chains. For example, in some industries, much of the value added in a value chain is created in the downstream or upstream stages of the value chain, where activities tend to have a strong service component (Figure 1).

Figure 1. Location of value added in the value chain

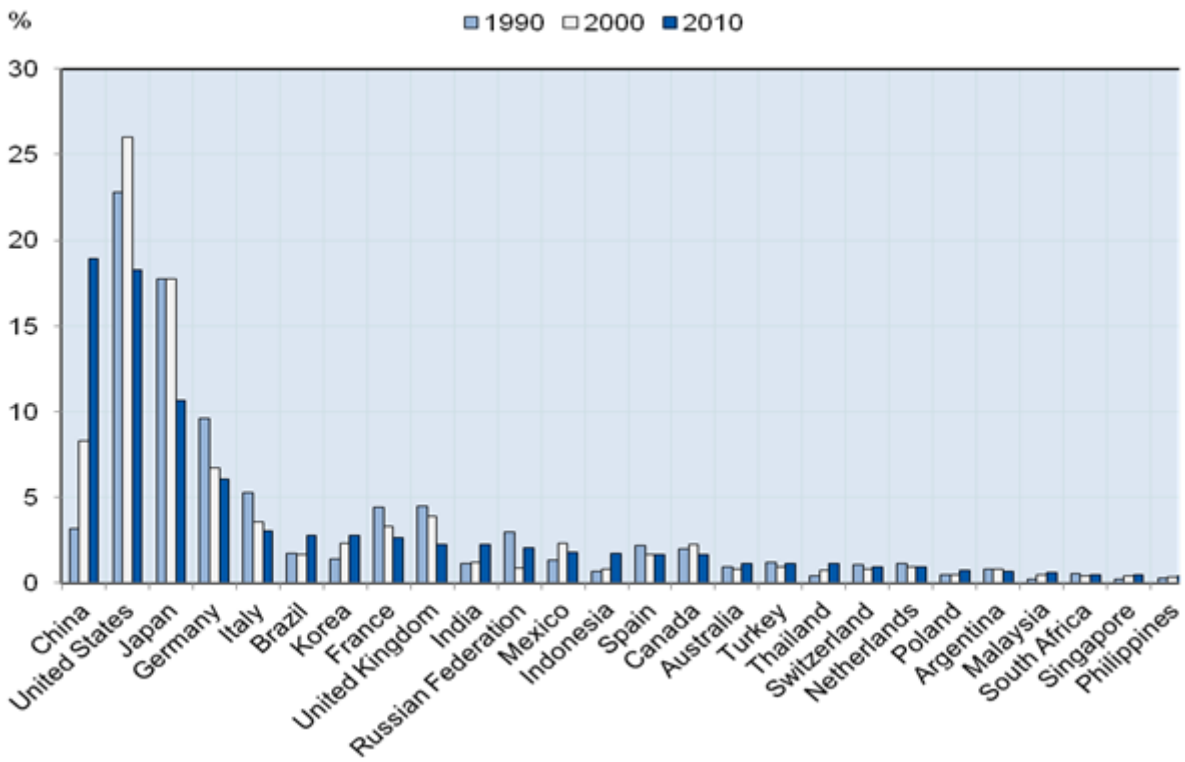


Source: Gary Gereffi, presentation at OECD workshop, September 2010.

As wages and incomes in OECD countries have increased, firms have increasingly moved their activities to these areas of the value chain, outsourcing some of their more labour-intensive production and assembly activities to low-wage producers. As a result, over the last 30 years, some consider that there has been a tendency in OECD countries for the 'smile curve' shown in Figure 1 to deepen, moving from relatively flat (good jobs all along the chain) to U-shaped, with fabrication and assembly accounting for a much lower share of value added[2] (see, for example, Baldwin and Evenett, 2012).

However, notwithstanding the decreasing importance of fabrication and assembly in terms of (direct) employment and (nominal) value added, manufacturing industry still occupies a central position in OECD economies, and OECD countries still account for the bulk of manufacturing value added, even if some non-OECD regions of the world, notably China, have grown considerably in importance over the past two decades (Figure 2). Input-output analysis, for example, points to the important interdependencies between manufacturing and other sectors of the economy, with important backward and forward linkages. In many OECD countries, manufacturing still accounts for a very large share (typically, over 40%) of total demand, the bulk of investment of the business sector in formal R&D and the majority of international trade.

Figure 2. Share of global manufacturing value added



Source: OECD estimates, based on UNSD

The concerns over the loss of manufacturing are often related to the erosion of the so-called industrial commons. This argument suggests that the loss of core manufacturing activities may set off a reaction, which will subsequently erode adjacent activities in the value chain, both upstream and downstream, including activities related to innovation and design, all of which could eventually weaken the competitiveness of OECD countries (Pisano and Shih, 2009, 2012). An implication is that – at least in the view of some commentators – high-income countries may struggle to retain innovative, R&D-based and higher value-added activities if they rely on these areas alone: ceding capacities in manufacturing might result in the loss of R&D and design capabilities in the longer term.

As noted above, manufacturing is not the only area where (some) governments in the OECD area and beyond are looking for new sources of growth. Green growth is another area that is currently being explored in several countries and is the subject of a recently published OECD Green Growth Strategy (OECD, 2011). Moreover, investment in intangible assets might provide another source of future growth, and is also the subject of an OECD research programme on new sources of growth.

In all these cases, the question is - to what extent can and should government intervene in the market with the aim of strengthening specific sectors, technologies and activities? What is the policy rationale for such action and how precisely should government intervene, if a sound policy rationale can be established? This is discussed in the rest of the paper.

4. Definitions of industrial policy

Although concerns about the declining share of manufacturing and the challenge from emerging countries form part of the background to the resurgence of interest in industrial policy, it is clear from the literature that the phrase 'industrial policy' has many meanings, not all of them specific to manufacturing industry. In the development literature, industrial policy is often synonymous with 'industrialisation policy' (Lall, 1987); and to those whose primary concern is with the decline of manufacturing in OECD countries, industrial policy is effectively the same as manufacturing strategy.[3] But to others, industrial policy means a targeted sectoral policy, not necessarily aimed at the whole of manufacturing or even limited to the manufacturing sector in its scope.

An even more general use of the term industrial policy is in a purely functional sense that is very close to general competitiveness or productivity policy. Industrial policy in this sense is similar to the current policy priority – growth strategy – or to what used to be referred to as supply-side policy. Such an approach still admits of a sectoral flavour: for example, the European Commission (2002) defined its then mainly horizontal industrial policy in this way:

> "Industrial policy is horizontal in nature and aims at securing framework conditions favourable to industrial competitiveness. Its instruments, which are those of enterprise policy, aim to provide the framework conditions in which entrepreneurs and business can take initiatives, exploit their ideas and build on their opportunities. However, it needs to take into account the specific needs and characteristics of individual sectors. It therefore needs to be applied differently, according to the sector. For example, many products, such as pharmaceuticals, chemicals, automobiles, are subject to detailed sector-specific regulations dependent on their inherent characteristics or use. Industrial policy therefore inevitably brings together a horizontal basis and sectoral applications."

Aiginger and Sieber (2005) characterised this as a 'matrix type' of industrial policy though, more recently, the EU position has moved towards a position which involves a more active sectoral dimension.[4]

Riess and Välilä (2006) characterise 'industrial policy' as an elusive construct, with a wide variety of views on its definition, conceptual underpinnings and real world effectiveness. The range of definitions of industrial policy in the literature is certainly extremely wide, as Table 1 illustrates. UNCTAD[5] defines industrial policy as a "concerted, focused, conscious effort on the part of government to encourage and promote a specific industry or sector with an array of policy tools". The World Bank (1993) considers industrial policy as comprising "government efforts to alter industrial structure to promote productivity-based growth". Crafts (2010), drawing on Caves (1987), defines industrial policy as "any public sector intervention aimed at changing the distribution of resources across economic sectors and activities". For Rodrik (2008), industrial policy aims to "stimulate specific activities and promote structural change" and he explicitly recognises that this could include agriculture and service industries as well as manufacturing. Following Rodrik, Naudé (2010a) adopts a broad definition of industrial policy as "the process whereby governments aim to deliberately affect the structural characteristics of their economies".

Table 1.Definitions of industrial policy

"Industrial policies are concerned with promoting industrial growth and efficiency." (OECD, 1975)
"Industrial policy may be generally defined as any government measure, or set of measures, to promote or prevent structural change." (Curzon-Price, 1981)
"....the term industrial policy indicates the relationship between business and government on a microeconomic level..." (Wachter and Wachter, 1981)
"....everything which is useful to improve growth and competitive performance." (Adams and Klein, 1983)
"Industrial policy... means government policy aimed at or motivated by problems within specific sectors." (Tyson and Zysman, 1983)
"Industrial policy means the initiation and co-ordination of governmental initiatives to leverage upward the productivity and competitiveness of the whole economy and of particular industries in it." (Johnson, 1984)
"Industrial policies refer to those policies intended to affect in some ways manufacturing or service industries." (Graham, 1986)
"....a wide-ranging, ill-assorted collection of micro-based supply initiatives which are designed to improve market performance in a variety of occasionally mutually inconsistent ways." (Geroski, 1989)
"Industrial policy is an attempt by a government to encourage resources to move into particular sectors that the government views as important to future economic growth." (Krugman and Obstfeld, 1991)
Industrial policy is one "aimed at particular industries (and firms as their components) to achieve the outcomes that are perceived by the state to be efficient for the economy as a whole." (Chang, 1994)
Industrial policy "can be defined as any policy affecting the allocation of resources to industry and in this sense embraces both macroeconomic policy ... as well as the more traditional areas of microeconomic policy." (Sharp, 1998)
Industrial policy is "every form of state intervention that affects industry as a distinct part of the economy." (Foreman-Peck and Frederico, 1999)
Narrow view: "Restrict attention to policies that target particular firms and industrial sectors."
Broad view: "any policy that shapes or influences the competitiveness of a country's firms and industries." (Beath, 2002)
"...restructuring policies in favour of more dynamic activities generally, regardless of whether those are located within industry or manufacturing per se." (Rodrik, 2004)
Industrial policy is "the activity which creates a favourable environment for European business in general, the manufacturing sector and its industries in specific." (Aiginger and Sieber, 2005)
"Industrial policy refers to a set of measures taken by a government and aiming at influencing a country's performance towards a desired objective." (Pitelis, 2006)
Source: Based on Aiginger (2007) and White (2008).

Common to many of the definitions that have been used, including those of Rodrik and Naudé, is a declared intention to alter the structure of the economy, whether or not explicit sectoral targeting is involved. A commonly used and widely cited definition is that of Pack and Saggi (2006), who define industrial policy as "*any type of selective intervention or government policy that attempts to alter the structure of production toward sectors that are expected to offer better prospects for economic growth than would occur in the absence of such intervention*."

However, as can be seen from Table 1, some definitions are much more general; for example Adams and Klein's definition includes "everything which is useful to improve growth and competitive performance"; while Pitelis includes "measures taken by a government and aiming at influencing a country's performance towards a desired objective". Other definitions, while not nearly as broad, embody the idea that industrial policy includes measures aimed at improving the environment for business and

addressing the needs of manufacturing and/or service sectors without necessarily having the explicit aim of changing the structure of the economy. It is also the case that ostensibly general, or 'horizontal', economic policies can be implemented in more targeted ways or turn out to be very uneven in their impacts across sectors. Thus, there is a danger that if industry policy is defined only as those policies with an explicit selective orientation, then interventions with an important impact on industry may thereby be missed.

For these reasons, while the Pack and Saggi definition has a number of advantages, in this paper, we intend to use a definition that is sufficiently broad to encompass the variety of uses that are commonly made of the term 'industrial policy'. Given the range of usage, and the futility of attempting to control the use of the term in the literature, never mind popular parlance, it seems better to embrace an inclusive overall definition of industrial policy. However, we will then use this as the basis for a taxonomy that will enable us to categorise types of industrial policy and drill down to the range of policies that are of interest for particular purposes, including evaluation.

In this spirit of inclusiveness, we propose to adopt, for the purposes of this paper, the following more general adaptation of the Pack and Saggi definition:

> "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."

The italicised phrases indicate five important differences from the Pack and Saggi definition:

- The definition includes *any type of intervention* not just selective or targeted interventions, thus including functional or horizontal policies as well as more targeted approaches
- Policies that aim to *improve the business environment* – sometimes referred to as 'framework conditions' – are included, not just those with the express aim of altering the structure of the economy.
- Policies include those that aim to alter the structure of *economic activity*, a much broader term than 'production', which might be construed as relating only to the production industries (typically manufacturing, construction, primary production and water and sewage) or the manufacturing sector alone or, even more narrowly, the fabrication stage of the manufacturing value chain.[6]
- It is recognised that industrial policy may aim to switch resources not only to particular *sectors* but also towards certain *technologies* (for example biotech, ICT or clean-tech) or even '*tasks'* (shorthand for both tasks and bundles of tasks or activities that make up stages in the value chain, for example design or logistics).[7]
- Finally, although most explicit industrial policy generally has a productivity, employment or growth objective, it is recognised that governments have other policy goals that contribute to *societal welfare*, and the pursuit of these goals may have important industrial policy-type effects – examples might include regional policy, energy and climate change policy, health policy and defence/security policy. Often industrial policy is closely integrated with other policies as part of a broader government social and economic strategy with wide ranging goals.

A distinction is sometimes drawn between industrial policy and industrial strategy. Here, we will use the terms more or less interchangeably. The term 'industrial strategy' might typically be more appropriate for an industrial policy with a broad coverage and probably a wider range of instruments than a more narrowly focused approach. A strategy would usually also be accompanied by a vision statement and a set

of objectives, aims, targets, monitoring arrangements, and plans for resourcing, communications and risk handling. We would see these as being the distinguishing characteristics of a strategy rather than any differences in the specific measures or policy approach.

This broad definition of industrial policy (or strategy) then subsumes other policies as a special case. So industrialisation policy would be a form of industrial strategy with a suite of policies designed specifically to move a developing economy to the next stage of economic development through promoting the growth of the manufacturing sector in the economy. A manufacturing strategy would be a set of policies, perhaps more appropriate to developed economies, designed to facilitate the success of manufacturing or subsectors of manufacturing. Likewise a policy to support the aerospace sector or a tourism strategy would be a form of industrial policy, as would a biotech strategy, a low carbon technology strategy, a defence industrial strategy or a design strategy. At the other end of the scale, a broad economic growth strategy, or a competitiveness strategy, would be a form of industrial policy consisting of a set of policy measures designed to improve the conditions for business growth, with or without targeted interventions in support of sectors, technologies or tasks.

Already in this brief discussion, a number of dimensions may be identified that could be helpful in developing a taxonomy for industrial policies. Perhaps the large number of dimensions to industrial policy, broadly defined, is one of the reasons why no clear taxonomy for industrial policies has yet emerged. A review of the literature suggests the following possible dimensions that could serve as the basis for a taxonomy:

Aim: Is the goal of industrial policy to promote industrialisation, to boost productivity growth, to promote the development of a particular sub-sector, to create or preserve employment, to address societal challenges such as combating climate change, to improve the distribution of income, or to address regional imbalances? Knowing the aims and objectives of industrial policy is of particular importance when it comes to carrying out *ex post* evaluation of its success.

Target group: Is the policy aimed at a specific sector (or technology, or input, e.g. R&D, or stage of the value chain), at individual firms or at local/regional clusters?

Rationale: Is the philosophy that the distribution of economic activity should generally be left to the market, is there a role seen for correcting market failures or, indeed, is market failure regarded as endemic? To what extent does thinking based on new growth, evolutionist and institutionalist models shape the approach taken to addressing market failure? How is systems failure viewed? What about government failure? Are there areas where government action can be particularly effective in reducing distortions or unlocking inertia?

Policy domain: Do the instruments of industrial policy operate mainly on the product market, or are they focused on factor markets – labour, capital, land and technology? What is the role for policies aimed at developing entrepreneurship or facilitating co-ordination or at the creation of new systems and networks?

Policy orientation: Is policy horizontal/functional or vertical/selective? Is targeting done strategically or in response to market pressures? Is intervention time-limited or longer-term? Is support conditional or unconditional? To what extent does policy work with existing comparative advantage or explore new areas?

Any one of these dimensions, or combination of them, could be used as the basis for a taxonomy of industrial policies. Categorising industrial policies by their aim might be important in some circumstances (and being clear about the policy aim is certainly crucial for evaluation). However, apart from the fact that

policies often have multiple aims and may not fit neatly into one category or another, the policies that are of the most interest for the industrial policy debate are heavily skewed towards one category, *i.e.* policies whose ultimate goal is to improve economic performance. Similarly, the target group for industrial policy – and, in particular, whether policies are targeted at individual firms, groups of firms or sectors – is probably of secondary interest in the debate on the principles of industrial policy, although of considerable importance when it comes to implementation and design.

The most promising areas to explore in developing a new taxonomy would seem to be the rationale, orientation and domain. There is some overlap between these dimensions. In the following section, we discuss in more detail the rationale for industrial policy and the evolution of thinking over time, and then we propose a new typology essentially based on the orientation and policy domain, but reflecting some of the thinking about the justifications for policy intervention that feature in the debate over rationales.

5. Possible rationales for industrial policy

The post-war period has seen an evolution in thinking about the rationale for industrial policy. A number of authors have reviewed the development of industrial policy thinking over time and cast light on the evolution of rationales (Sharp, 2001; Peres and Primi, 2009; Naudé, 2010a; Owen, 2012; Pryce, 2012). Drawing on this literature, the phases of development of post-war thinking about industrial policy can be characterised as a period of traditional hands-on industrial policy, followed by a retreat to something closer to a market-driven, *laissez-faire* outlook, in turn evolving into a neoclassical market failure framework, which was then widened into recognising the role of government in promoting the development of capabilities and, most recently, an emphasis on the role of government in fostering systems, building institutions and facilitating co-ordination. Some of the evolution of thinking is illustrated in Table 2 (Naudé, 2010a)

Table 2. Evolution of theory and practice of industrial policy

Phase	Key ideas
1940s to late 1960s	Industrialisation is necessary for development Market failures would prevent this from happening automatically Market failures are pervasive in developing countries Industrial policy is needed, particularly infant industry protection, state ownership and state co-ordination
1970s to 1990s	Practical obstacles to industrial policy are considered significant Government failure is worse than market failure. Industrial policy is an invitation to waste and rent-seeking Trade liberalisation (exports), privatisation and attracting FDI together with macroeconomic stability and minimum government interference are the basic requirements for growth and industrialisation The era of the Washington consensus, especially after the debt crisis of the early 1980s and the ubiquity of structural adjustment programmes
2000s to present	Market and government failures are present The 'how' rather than the 'why' of industrial policy is important Institutional setting matters but design difficult Flexibility in the practice of industrial policy is important Differences exist with respect to the extent to which comparative advantage needs to be defied, not the principle Innovation and technological upgrading should be a central objective of industrial policy Promoting national innovation systems should be an important objective of industrial policy

Source: Naudé (2010a), details on representative authors/contributors to the debate on industrial policy shown in the original source.

Pryce (2012) traces a similar pattern in the evolution of thinking about industrial policy in the United Kingdom, distinguishing three generations of industrial policy: a first generation in which government sought, largely unsuccessfully, to pick winners through state aids, national champions and nationalisation; a second generation where the focus was on privatisation and financial deregulation, which eventually ran out of steam; and a third generation of sector-specific and often piecemeal intervention, often motivated by the need to correct market failure or address obstacles to growth. Pryce goes on to advocate a 'fourth generation' industrial policy based on a holistic approach to policy and a new partnership between the private sector and the state.

The evolving rationale for industrial policy

Reflecting this evolution of thinking, and drawing on the discussion in Sharp (2001), it is possible to distinguish a number of different rationales, which might be characterised as:

- *Laissez-faire*
- Traditional, state-aids/ownership-based
- Neoclassical, market-failure correcting, Pigovian tax/subsidy-based
- New growth, technological capabilities-based
- Institutionalist, neo-Schumpeterian, evolutionist, systems-based

According to the *laissez-faire* view, there is no need for an 'active' industrial policy, still less a targeted one. The market automatically selects sectors and firms so as to ensure the efficient allocation of resources. The role of government is to ensure the best possible environment for business in its approach to product, labour and capital market regulation and to ensure macroeconomic and financial stability, *i.e.* to focus on the 'framework conditions'. The belief in the efficacy of market mechanisms and a policy focus on initial conditions is itself a form of industrial policy, albeit one rarely seen in its purest form. Sometimes nineteenth century Britain is put forward as an example of such a *laissez-faire* approach, or the United States in much of the 20th century, although closer examination of most such examples suggests that the state intervened in many ways even within a broadly free market environment. The view of industrial policy forged in the 1980s and 1990s, under the so-called Washington Consensus, was also close to the *laissez-faire* end of the spectrum, partly in response to the lack of success with more active industrial policies pursued in many countries in the 1960s and 1970s, though with an acknowledgement of the need for policy action to create favourable framework conditions.

Under the **traditional approach**, attempts were made to stimulate certain sectors of the economy through production subsidies or other forms of state aid or in some cases through the promotion of national champions through nationalisation, the encouragement of mergers or preferential procurement policies. Some proponents of this form of industrial policy argued that benefits were to be derived from building on forward or backward linkages between economic sectors or branches of industry. The important role of manufacturing industry was often highlighted in this connection because of its linkages with other industries, knowledge spillovers due to large R&D investments and dynamic economies of scale. Although market failure arguments were used in support of this type of industrial policy, industries and firms were often identified for support on the basis of weak selection criteria, leaving policy open to rent-seeking behaviour on the part of economic agents. Baldwin and Robert-Nicoud (2007) use a variant of the Grossman and Helpman (1994) 'Protection for Sale' model to argue that the asymmetric appropriability of rents makes it inevitable that losers will lobby harder.

At its worst, traditional industrial policy came to mean the relatively crude use of taxes and subsidies to persuade producers and consumers to act in line with government wishes, based on an attempt to second-guess the market and/or in response to lobbying from those who had most to lose. It was the failure of many such attempts at a traditional approach to industrial policy that caused a reaction against industrial policy which continues in some quarters to this day.

The more nuanced **neoclassical or market failure approach** is the recognition that, even in the eyes of those who favoured a non-interventionist stance, public action is needed to correct market failures (externalities, market power, capital market failures) and to guarantee the provision of public goods. Most market failures reflect a mismatch between the structure of private and social benefits in a particular economic activity. Typically, in the industrial policy context, they may be associated with positive externalities (of exporting, FDI, innovation, manufacturing, *etc*.) and informational asymmetries, implying that private investments will be lower than socially desired levels.

Policies to remedy market failures, such as Pigovian taxes and subsidies, can be horizontal in nature (e.g. subsidies for R&D, provision of infrastructure, active competition policy) or they can be more targeted. The market failure case for selective policies is often more controversial but, in addition to highly industry-specific examples, following Crafts (2010), three types of market failure can be highlighted: infant industry-related capital market failures; agglomeration externalities; and rent-switching via strategic trade policy:

Infant industry

Infant industry arguments provide probably the longest-standing source of justification for public support of capacity-building in industry. Infant industry ideas have a number of variants, and their implementation often requires tariff or import quotas to protect nascent sectors from import competition. Such arguments often draw on observations of the historical record, where a number of the world's largest market economies underwent industrialisation processes in the presence of barriers to trade.[8] In the context of debates on infant industry protection, two forms of purported market failure have received greatest attention: imperfect capital markets and problems of appropriability (Krugman and Obstfeld, 2009).

Imperfect capital markets are likely to be more important in emerging market economies than in OECD member countries. Furthermore, capital market failure seems to be more prevalent in equity finance and less so in the provision of debt. The market for equity seems not to function optimally for some segment of firms (notably small and medium-sized enterprises and start-ups). This is largely a consequence of the fact that for venture capitalists the costs of managing investments are more or less invariant with respect to the size of the deal. Accordingly, small-scale investments can be relatively unattractive.

Problems of appropriability exist in many forms, but all depend on the idea that a new form of industrial activity will create some form of social benefit for which entrepreneurs are not compensated. For instance, pioneering entrepreneurs in a new industry establish the supply side of a market, as well as creating markets for relevant inputs. In so doing, the pioneering firms provide valuable information to other potential entrepreneurs. Information is afforded on the relative merits of different business models, products, services, potential markets (in the case of exports) and marketing approaches. Even the failure of new ventures provides valuable information, showing for instance what sorts of strategy are not successful. Empirical evidence exists for such learning and imitation phenomena.[9]

Agglomeration economies

Studies in new economic geography suggest that agglomeration economies accrue when economic activity is characterised by economies of scale and knowledge spillovers between related activities located in the same geographical cluster. Better availability of intermediate inputs, access to relevant specialised knowledge and thicker labour markets are other advantages of co-location. In such cases, there may be gains from policy intervention that facilitate the expansion of an agglomeration or even the establishment of a successful cluster with first-mover advantages. Such effects are often present in advanced manufacturing and in service sectors such as creative industries and financial services.

Supporting specific industries via strategic trade policy

Brander and Spencer (1985) describe the concept of strategic trade policy. The idea is that if two countries export to a third non-producing country, and one country (A) subsidises its exporting industry, then the exporting industry in the other country (B) may have to reduce output. Rents are shifted from firms in country B to firms in country A, and from taxpayers in country A to consumers in the importing country. Depending on the relative size of these rent shifts, a gain in national welfare may be achievable through the subsidy. However, a practical critique of this theoretical possibility is that more information is required than governments are likely to have access to. Such information gathering is complicated by the fact that subsidies will affect cost structures in related industries, not just in the industry being subsidised. Governments would require a complex understanding of industries which compete for resources with the target industry (Krugman and Obstfeld, 2009). Using inaccurate information could lead to significant costs for the government. In addition, strategic trade policy entails risks of foreign retaliation.

As well as being important to the neoclassical approach, externalities and the appropriability of rents also play a crucial role in the approach based on **endogenous growth or new growth theory** models. Sharp (2001) draws the following distinction:

> "In many respects these theories represent a dynamic extension of the neo-classical approach. Firms benefit not only from static economies of scale and scope but also, over time, from the cumulative learning embodied in building up and maintaining a production process. In particular these theories emphasise the externalities associated with R&D and the degree to which growth emerging from technological advances is endogenised".

In this approach, the emphasis is on the role of investment in R&D, technology, education and training, with the associated accumulation of knowledge and spillover benefits. Policies designed to promote investment in tangible and intangible capital are justified in terms of this approach. A similar approach can be found in the emphasis on the accumulation of productive capabilities in the development literature (Andreoni, 2011).

The theme of productive capabilities also features in the final category of approach that we will consider here, though with a very different emphasis. As shorthand, we will use the term **systems approach**, but this is an eclectic category that includes elements of Schumpeterian, evolutionist and institutionalist thinking.[10] The common factor is a focus on the processes for the generation, absorption and commercial exploitation of knowledge. In contrast to neoclassical approaches, which view knowledge as homogeneous and believe that it can disseminate instantly, systems approaches suggest that knowledge is heterogeneous, context-specific, tacit and 'sticky'. Actors face genuine uncertainty, to which they have to adapt, rather than dealing with the more tractable risk distributions of neoclassical economics. In the Schumpeterian view of the world, the emphasis is on the cumulative nature of technological progress and the importance of learning from accumulated knowledge passed on by word of mouth within institutions. Nelson and Winter (1982), in their seminal work on evolutionary economics, observed that corporate

behaviour was often determined by tacit knowledge in the form of rules and routines learned within the corporate framework and passed on from one generation of managers to another. By a similar process, rules and routines become embodied in other institutions, public and private. Networks of formal and informal connections between relevant institutions make up the national system of production and innovation. In this view, the role of industrial policy, hand-in-hand with innovation policy, is to create and develop institutions to promote networking and collaboration and to devise strategies to make best use of these institutions.

Current policy thinking also increasingly adopts a 'systems failure' approach to industrial policy and innovation. This approach is somewhat wider than – but does not displace – the 'market failure' rationale. It addresses the broad set of interactions between groups of key institutions that create the operating environment and learning context for firms. Implied in the systems approach is that governments interact with firms in numerous ways, and that an essential government role is to engage in dialogue with business in order to establish where public support is best deployed in order to capitalise on positive externalities, without the process being captured by any special interest group.

In essence, the systems approach is designed to overcome co-ordination problems. Some examples may help illustrate this. Rodrik (2008) discusses the case where lack of co-ordination might hinder the industrial development of countries, as co-ordination between different actors is necessary for large-scale investments with high initial fixed or sunk costs.

A second example is where actors in a given industry become 'locked-in' to an old standard when it would be beneficial for all to move to a new standard (Swann, 2010).[11] Moving to a better standard might require co-ordination decisions across many and diverse actors, an outcome that might be beyond the influence of any single actor to bring about. In such cases, government action might bring positive net benefits. In the standards-setting process, helping to provide a context in which otherwise under-represented groups participate might be a valuable government role in all circumstances. In practice, if seeking to co-ordinate a shift from an inferior to a superior standard, difficulties may exist in identifying and agreeing what the superior standard is.

Finally, the process of setting an industrial strategy may be important in itself as a means of aligning private sector efforts and governmental priorities. On this view, articulating a clear industrial strategy or vision is of value even in the absence of specific policy initiatives or incentives, *a fortiori* if these involve subsidies that could be expensive or distortive. This was perhaps best expressed by Chang (1997):

> "One interesting thing that has emerged from the debate on industrial policy of the last two decades or so is the recognition that industrial policy is more about broad 'vision' and co-ordination than about doling out subsidies or providing trade protections. Many commentators have pointed out that the East Asian countries do not necessarily spend more money on industrial policy than others, but that their industrial policy is more successful because they have a dense institutional network of co-ordination that facilitates information flows between the government and business, on the one hand, and between firms, on the other hand. It is also pointed out that industrial policies in these countries work not only by providing detailed solutions to specific sectoral problems but also by providing a broad 'vision' of the future of the economy, along which a voluntary co-ordination of activities could be achieved by private sector agents. In short, the recent debate has revealed that the issue of organisational design and institutional building is as much, if not more, important in determining the success of industrial policy as the issue of designing incentive schemes."

Practical arguments against industrial policy: government failure

Opponents of industrial policy argue that the existence of market failure, systems failure or other rationale is not in itself enough to justify government intervention, as 'government failure' can be present as well. If government failure is more of a problem than the market or systems failure behind the rationale, then industrial policy can result in lower overall welfare. Governments often lack the information and capability to design effective industrial policies, and hence invite rent-seeking behaviour from economic agents (Rodrik, 2008; Naudé, 2010a).

Information constraints make it extremely difficult for governments to know which industries and/or firms merit support. In cases where positive externalities are considered likely, gauging the scale of such spillovers is extremely problematic. But knowledge of the magnitude of spillovers is important in order to decide the scale of any policy response (and to assess the policy's opportunity costs). In the absence of good measurement, risks exist that governments resort to barely quantifiable and conceptually weak selection criteria. Support for 'sunrise industries' and 'national champions' may often be of this sort.

Reflecting the above considerations, the successful implementation of any industrial policy will likely depend on the nature of the political system and institutions in the country concerned. Where the power of economic interest groups exerts undue influence through the political system, government support of an industry could be based more on political considerations than economic merits. Existing (large) firms and industries are typically better organised than new (small) ones, and might thus be more successful in receiving policy support.

It is also easy for protection to perpetuate inefficiency. Support could be difficult to withdraw when no longer needed, or even if the policy has failed. In an emerging markets context, Krugman and Obstfeld (2009) describe the cases of India and Pakistan, where manufacturing was protected for many decades, and where the recent growth of significant exports of manufactures has been based on light manufactures, rather than the heavy manufactures that had been the target of protection.

Some commentators suggest that governments assist industries in decline. Often the objective is to attempt to safeguard employment. It may also be argued for on the grounds that other governments are subsidising these same industries (arguments for support of the steel industry in the United States have taken this form). But public support for industries in decline entails financing some part of the operations of industries that have low or negative investment returns. In some cases, rather than encouraging private sector investment in unprofitable industries that are being subsidised abroad, it might make more sense to take advantage of the foreign subsidy by importing the cheaper foreign goods. It is also often questionable whether the industrial policy operated abroad is in fact the reason for the export success in the industry in question.

Whether there is a case for active industrial policy is based on the long-standing debate regarding the presence of market failures on the one side (hence, providing a basis for industrial policy), and government failures which even in the presence of market failures might militate against industrial policy. The first best policy response would generally be to correct the failures encountered, which is often not possible. Nevertheless, it should be kept in mind that industrial policy is a second-best solution and hence comes at some cost.

Partly in recognition of the dangers of rent-seeking, regulatory capture and feather-bedding, there has been a trend in 'new industrial policy' thinking away from traditional product market subsidy-based forms of industrial policy and towards 'soft' industrial policy, based on a more facilitative, co-ordinating role, consistent with the systems approach described above. So, for example, Harrison and Rodriguez (2010) advocate:

> "There is an important role for what we refer to as 'soft' industrial policy, whose goal is to develop a process whereby government, industry, and cluster-level private organisations can collaborate on interventions that can directly increase productivity. The idea is to shift the attention from interventions that distort prices to interventions that deal directly with the co-ordination problems that keep productivity low in existing or raising sectors. Thus, instead of tariffs, export subsidies, and tax breaks for foreign corporations, we think of programmes and grants to help particular clusters by increasing the supply of skilled workers, encouraging technology adoption, and improving regulation and infrastructure. While 'hard' industrial policy is easier to implement than 'soft' industrial policy measures, tariffs and subsidies become entrenched and are more easily subject to manipulation by interest groups."

Today there is a well established consensus that government is not easily able to 'pick winners' but is better placed to act as a facilitator to enable closer co-ordination between individual economic agents and to allow for experimentation in the economy. In a world characterised by rapidly increasing internationalisation, the geographical fragmentation of production and the growing importance of multinational enterprises, the policy space open to governments is increasingly constrained. In these circumstances, some countries are shifting their approach away from one-time attempts to 'pick winners' to the design of better processes for search and 'self-discovery'.[12] In the process, mistakes and errors are understood to be inevitable; the policy challenge is to design governance procedures to detect and correct them and to manage the associated vested interests (Rodrik, 2008). Such an approach is not immune to the dangers of government failure, but it is much less prone to it than old fashioned intervention based on state aids, tariff protection and state ownership.

6. A new typology for industrial policy

In the preceding section, tracing the evolution of the rationale for industrial policy, a taxonomy of approaches to industrial policy was set out based on the underlying rationale – be it *laissez faire*, traditional interventionist, neoclassical, endogenous growth or systems-based. While this taxonomy is useful in tracking the development of industrial policy thinking, it is less useful as a tool for categorising industrial policy. For one thing, the categories overlap, with market failure and systems failure being present for all but *laissez-faire* (and even then it would be an extreme version of the *laissez-faire* approach that ruled out market and systems failure altogether). Moreover, a framework which reflects the progression of thinking on industrial policy over time is less useful for analysing policies at a single point in time. Instead we propose a new typology based on the fourth and fifth of the dimensions identified earlier, namely the policy domain and policy orientation.

Policy domain

The instruments used in industrial policy range from direct and indirect support to specific firms and industries – through, for example, grants, subsidies, loans and tax credits – to support for knowledge institutions, infrastructure and skills. The characteristics of the instruments used for industrial policy vary considerably, ranging from the very narrow – only including the quantifiable subsidies granted to specific companies and industries – to the very broad, including all government initiatives to improve the business environment. Various attempts have been made to categorise the instruments of industrial policy. For example, Naudé (2010) gives an overview of the different instruments, distinguishing by broad domains such as economic signals and incentives, selective industry support, selection mechanisms, improving productivity and so on (Table 3). This draws on earlier work by Cimoli *et al* (2009), which distinguishes similar 'domains' of policy intervention, though with some differences in how policy instruments are assigned. Weiss (2011) also includes a categorisation of some of the more commonly used policy instruments, distinguishing functional (horizontal) from selective measures, and identifying the underlying rationale for each.

Although fairly general in their approach, many of these typologies have their roots in the development literature and reflect a particular perspective on the rationale for industrial policy. The typology we propose here, while borrowing from the earlier work, is based on a more neutral growth accounting-based view of the relevant policy domains. Just as conventional production functions and growth models link output to factor inputs and a parameter to represent technical progress and other intangible factors (or more generally, multi-factor productivity), so we propose that industrial policy instruments be classified according to domains covering product markets, labour markets, capital and credit markets, land markets and technology markets. To this we add an additional domain for policies designed to promote co-ordination, information flows, institution building, entrepreneurship and other systems functions relating to the interactions between markets, economic agents and government.

The proposed typology of instruments is set out in Table 4, which includes a two-way classification by policy domain and according to whether the policy orientation is horizontal or selective.[13] So, for example, in the product markets domain, horizontal policies would include policies to promote competition or reduce product market regulation as well as measures that affect prices across the board such as indirect tax policy or exchange rate policy. Any one of these policies could be applied in a more selective way (e.g. promoting competition in particular markets, or by changing relative prices through indirect tax changes) and even policies that are ostensibly ‘purely’ horizontal may have non-neutral effects (for example, an exchange rate change affecting the relative price of traded and non-traded goods). Policies in the product market domain that are more openly selective might include measures to promote national champions through state aids, tariff protection or state aids, targeted export promotion or public procurement, or temporary support measures such as car scrappage (or ‘cash for clunkers’) schemes.

Table 3. Domains and instruments of industrial policy

Domain	Instruments
Economic signals and incentives	- Intellectual property rights - Price regulations - Exchange rate policy (e.g., undervaluation) - Monetary (interest rate) policy - Countercyclical fiscal policy - Tax breaks
Scientific and technological innovation	- Scientific policies - High-tech lead projects - Funding of university research - Establishment of research centres - R&D subsidies and/or tax credits
Learning and improving technological capabilities	- Education and training policies - Foresight exercises (to identify national research priorities) - Labour training subsidies and/or tax breaks - Skills formation and upgrading schemes - International educational and research collaboration - Incentives for foreign direct investment
Selective industry support	- Impose import tariffs and/or quotas - Provide export subsidies/credit/support - Establish special economic zones - Use of state-owned enterprises/privatization - Create public utilities providing inputs (e.g., electricity) - Directed finance/subsidies - Provide public guarantees - Direct state procurement policy
Selection mechanisms	- Entry and exit regulations for firms - 'Live and let die' principle (Political will to end support to failing firms) - Introduce anti-trust and competition policy - Support national trading companies - Preferential access to finance - Long-term development finance
Distribution of information	- Collective action mechanisms - Promotion of standards - Use of consultative forums - Use of business chambers - Encouraging firm cooperation/firm linkages - Marketing of export industries - Dissemination of successful experiences
Improving productivity of firms and entrepreneurs	- Providing or subsidizing management training - Firm (SME) monitoring and assistance - Infrastructure, funding and management for incubators and cluster formation - Promotion of public-private partnerships - Location marketing and enhancement - Upgrading of economic Infrastructure - Creation of venture capital funds

Source: Naudé (2010a)

Table 4: A typology of industrial policy instruments by policy domain

Domain	Horizontal Policies	Selective Policies
Product markets	Competition and anti-trust Indirect tax Product market regulation Exchange rate policy	National Champions Nationalisation/privatisation Output subsidies/state aids Export promotion Price regulation (*e.g.* pharma) Public procurement Trade policy Car scrappage
Labour and skills	Skills and education policies Training subsidies Wage subsidies Income and employment tax Management advisory services Labour market regulation	Targeted skills policies Apprenticeship policies Sector-specific advisory services
Capital markets	Loan guarantees Corporate tax/capital allowances Macro/financial stability Financial market regulation	Strategic Investment Fund Emergency Loans State Investment Bank Inward investment promotion
Land	Planning regulation Land use planning	Enterprise zones Place-based clusters policy Infrastructure
Technology	R&D tax credit Science Budget IPR regime	Green technology Lead Markets Public procurement for innovation Patent Box Selective technology funding Centres of expertise
Systems/Institutions	Entrepreneurship policy Scenario planning Distribution of information Overall competitiveness strategy	Indicative planning Foresight initiatives Identifying strategic sectors Sectoral competitiveness strategy Clusters policy

In the capital markets domain, horizontal polices would include loan guarantees for SMEs, capital allowances and general corporate taxation, macroeconomic and financial stability measures, including the regulation of capital markets, while selective measures would include more targeted forms of financial provision such as the types of loans made available under a State Investment Bank or strategic investment fund. Targeted promotion of inward investment through awareness raising, tax breaks or subsidies would also feature here. Policies for other factor markets are described in the table, distinguishing horizontal from selective.

The final domain of Table 4 shows policies designed to improve the workings of systems and institutions. The more generic, horizontal polices in this category might include support for entrepreneurship, economy-wide measures to improve the flow of information, scenario planning, overall competitiveness strategy and the development of systems and institutions designed to enable government and business to work together to identify the areas where industrial policy is most likely to be effective. More selective polices in this domain might include indicative planning, foresight and other initiatives designating (but not necessarily otherwise supporting) sectors thought to be 'strategic' and/or sectoral competitiveness strategies, typically drawn up in conjunction with sectors or trade bodies to identify and address obstacles to growth or productivity improvement in a sector. Clusters policies, discussed further in Section 7 below and included in the table in the land-based policy domain, share many of the features of these systems/institutions based policies and a case could be made for including them in this domain as well.

Policy orientation

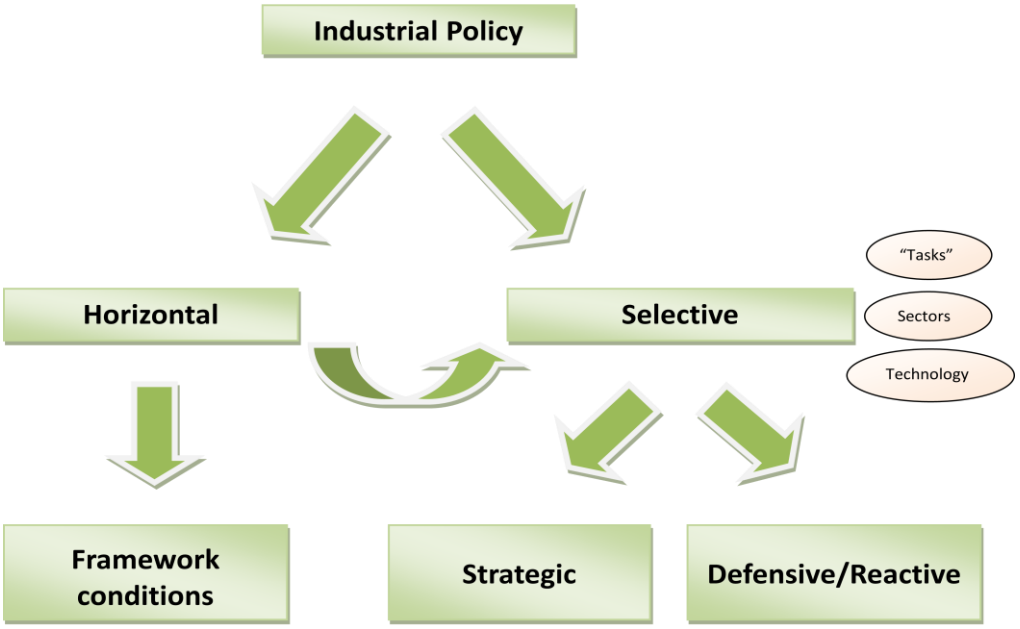
The preceding typology of industrial policy instruments by policy domain distinguished between horizontal and selective policy measures, described earlier as the policy orientation dimension. Within the category of selective policies, it is possible to drill down further according to the nature of the policy orientation. Figure 3 sets a conceptual framework which recognises, first, that selective policies may result either from a direct targeted approach to industrial policy or from the selective application of horizontal policies; second, that the selection can be according to sectors, technologies or 'tasks'; and third, that selective policies can be adopted for either strategic reasons or defensive reasons. These three aspects of the framework are developed in more detail below.

Pure horizontal policies are the equivalent of general business environment policies, or policies to improve the 'framework conditions'. As we have seen, horizontal policies often have a selective equivalent, e.g. targeted inward investment promotion or targeted skills policies, or sector-specific advisory services. Or ostensibly horizontal policies may turn out to be highly selective in their impact, e.g. general support for an input or activity that is used more intensively in some sectors than others (e.g. the impact of R&D tax credits is highly concentrated in the manufacturing sector). Recent OECD research using micro data (Bravo-Biosca *et al*, 2012) confirms that even broad horizontal policies can have quite heterogeneous impacts across the distribution of firms.

The target for selective policies is usually thought of as being sectors of the economy, for example manufacturing industry, the creative industries, business services, tourism etc. Aside from the fact that the sector boundaries used by business and policymakers very often do not conform to the standard industrial classification system, it is also clear that the targets of industrial policy are often more complicated, involving overlapping sectors, technologies, supply chains and/or the collection of tasks and activities that make up the stages in a value chain (Baldwin and Evenett, 2012). A selective industrial policy can be designed with any one of these dimensions in mind, or some combination of them. We will often use the term sectoral targeting as shorthand, recognising in practice that the targeting may be applied to sectors, technologies or tasks.

Within ***selective industrial policy***, a distinction may be made between strategic policy and defensive/reactive policy. Industrial policy may be characterised as defensive/reactive in orientation where it responds to acute challenges in the economic environment. For example, the policies introduced by some Western European economies in the 1970s in response to emerging competitive pressures on industries like coal mining and shipbuilding were essentially defensive in orientation. Some of the policies introduced in response to the 2008-09 economic crisis were also defensive; for example, loans to automotive companies, or the extension of loan guarantee schemes to a wider group of firms or on more generous terms, were among the recent examples of defensive policies.

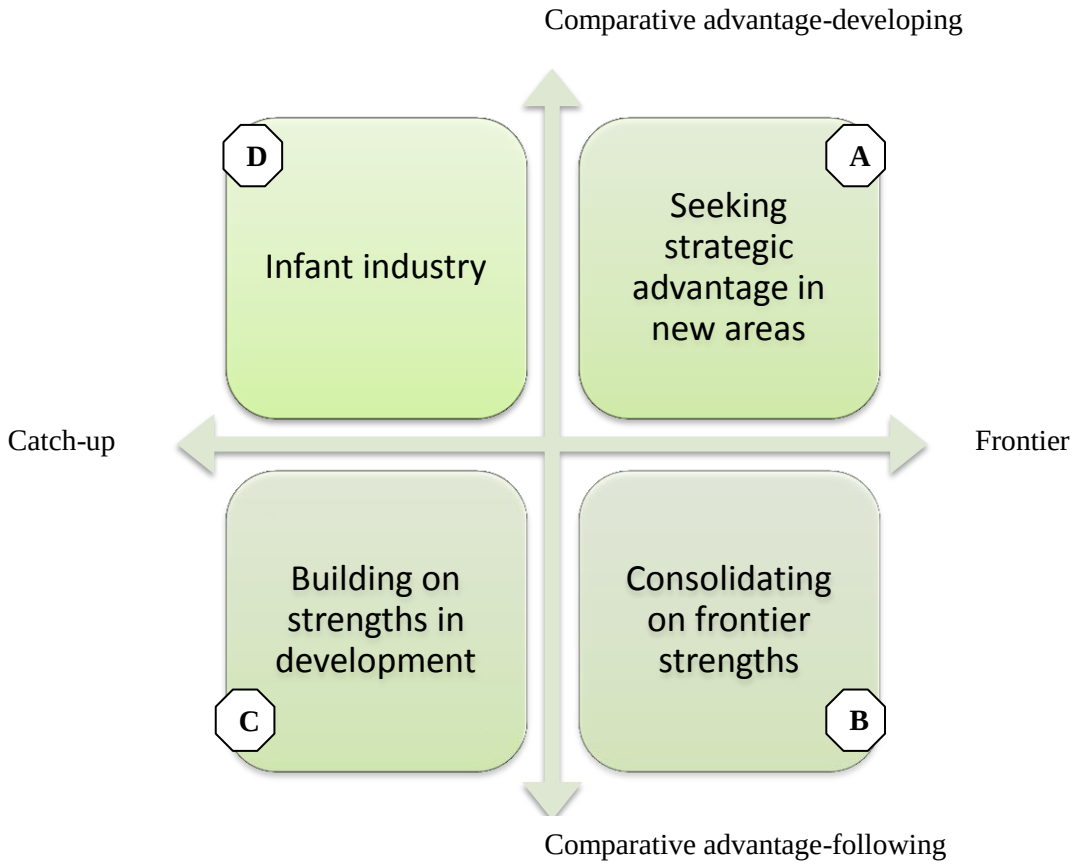
Figure 3. A typology of industrial policies by policy orientation



Arguably, policies designed to tide industry over a period of temporary disruption, arising for example from disruption to global value chains or to the flow of credit, may be less distorting and therefore easier to justify than those designed to attempt to slow the pace of structural change. However, in practice, it may be difficult to distinguish between the two *ex ante*, and therefore defensive polices need to be carefully designed and subject to close monitoring and evaluation. Ideally, they should be accompanied by conditionality that encourages structural reform in return for temporary funding, as happened with some of the support provided to the car industry. Similarly, defensive/reactive industrial policies that address the problems of longer term structural change should aim to promote orderly adjustment, through facilitating the transfer of resources from declining industries to new industries, or upgrading production into higher value added activities, rather than seeking to immunise sectors from the effects of change altogether.

Within the sphere of ***strategic industrial policy***, the literature makes two important and relevant distinctions – between catch-up and frontier industrial policies and between comparative advantage-following and comparative advantage-defying policies. The orientation of strategic industrial policy for a country that is far from the technology frontier is likely to be different from what it might be for a country that is at or close to the frontier. Within the development literature, which focuses on the position of countries in catch-up mode, there has been an active debate on whether industrial policy should follow comparative advantage or defy it (Lin and Chang, 2009). On one side of the debate are those, such as Justin Lin, who argue that role of industrial policy in developing countries should be to make possible the effective exploitation of the country's comparative advantage at each stage of development. On the other side of the debate are those, typified by Ha-Joon Chang, whose view is that development requires the acquisition of industry-specific technological capabilities through the experience of production and that it is by definition necessary to defy, or at least develop, comparative advantage if a country is going to enter new industries and upgrade its industrial structure.[14] These two approaches may imply different orientations for strategic industrial policy in a catch-up context.

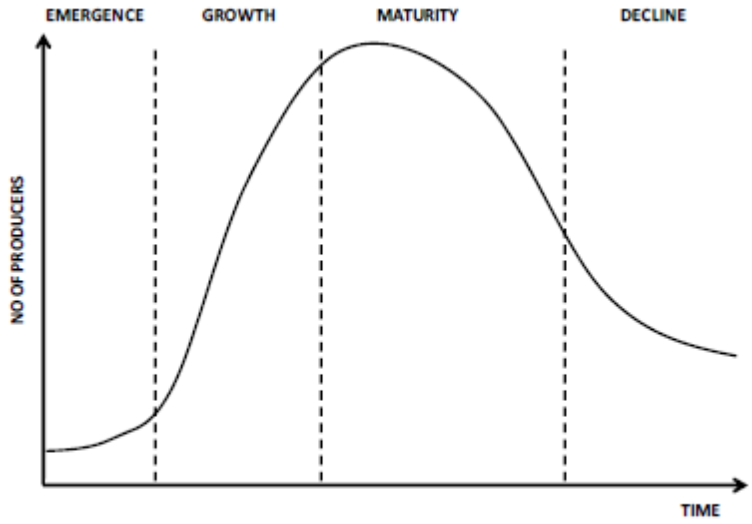
Figure 4. Two-way classification of strategic industrial policies



Something of the same dilemma arises in the choice of policy orientation for industrial policy in frontier countries. Should industrial policy aim to build on comparative advantage and existing strengths, or should it seek to develop strategic advantage in new areas, *i.e.* 'latent' or 'incipient' comparative advantage? This suggests a two-way classification of strategic industrial policy that can be represented in a four-quadrant diagram (Figure 4). In Quadrant A, the orientation of policy is that of a country at the frontier moving towards developing new areas of competitive advantage, likely involving technologically advanced or challenging areas with relatively high risk and reward, whereas in Quadrant B, the orientation is of a frontier country focusing more on consolidating existing areas of comparative advantage. For catch-up countries, those in Quadrant C would be following the Lin strategy of exploiting existing comparative advantage for their stage of development, whereas the orientation in Quadrant D is more in the direction of developing new areas of comparative advantage through moving into new industry sectors – essentially the infant industry rationale favoured by Chang.

An alternative way of illustrating a range of strategic and defensive approaches to industrial policy is through the relative industry maturity approach used by Livesey (2012). Building on earlier work by Gort and Klepper (1982) and Dinlersoz and MacDonald (2009), Livesey first discusses the concept of phases of industrial maturity, based on industry life-cycle models. These models are based on the observed tendency for the number of firms in an industry to start relatively low and stable, followed by a period of rapid growth, before the number peaks and subsequently declines as the market for the industry eventually decays. Figure 5 illustrates a typical pattern of emergence, growth, maturity and decline for a sector, using the number of firms as an indicator, although the concept could be generalised to include other indicators of the stage of an industry's development.[15]

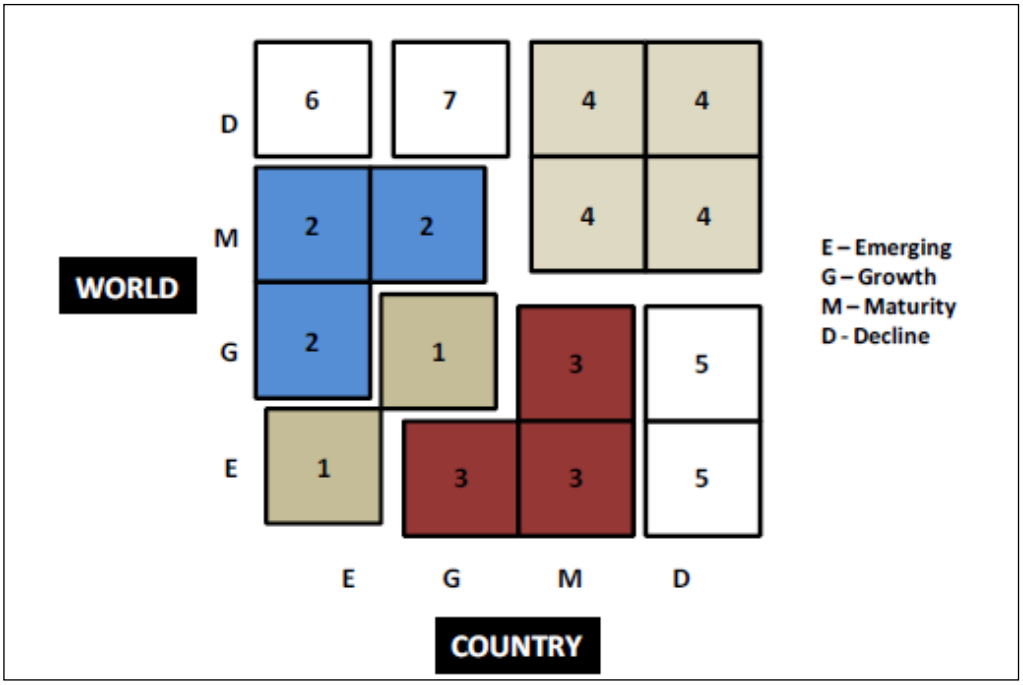
Figure 5: Stages of industry life-cycle



Source: Livesey (2012)

Livesey then introduces the idea of relative industry maturity by contrasting a country's position in the industry life cycle with the position of the industry abroad. This can be represented in a four-by-four grid (Figure 6) showing the stage of maturity of the home industry along the horizontal access and the stage of maturity of the global industry along the vertical axis. Each box in the grid then represents the comparative maturity of the industry sector in the home country relative to the global norm, with Box 7, for example, representing an industry that is in its growth phase in the home country, but at the stage of decline on a global level.

Figure 6. Comparative industry maturity and the orientation of industrial policy



Source: Livesey (2012)

The comparative maturity grid can be used as the basis for a mapping of the strategic and defensive policy orientations described in this section. Seven zones can be distinguished, with the following characteristics:

1. Sectors that are at the early stages of emergence and growth both at home and globally. These are the areas where the orientation of industrial policy is likely to correspond to the search for new sources of competitive advantage, or Quadrant A in Figure 4.
2. Sectors where the home industry is at the stage of emergence or growth but on a world scale it is more developed, though not yet at the stage of decline. Industrial policy in these sectors is likely to be characterised as developing country catch-up and comparative advantage-defying and may be the area of activity where an infant industry protection approach is followed, Quadrant D in Figure 4.
3. Sectors where the home industry is at the stage of growth or maturity but the industry on a world scale is less well developed. This is likely to correspond to the orientation of industrial policy in a developed economy consolidating on its strengths, Quadrant B in Figure 4.
4. Sectors that are either in the mature or declining stage at home and where the same is true on a world scale. This is the area where the need for selective industrial policy is least urgent and a horizontal approach is best – particularly one focused on allowing free entry and exit, upgrading the general level of skills and other capabilities and enabling resources to move easily between sectors.
5. Sectors where the home industry is in maturity or decline but the world industry is emerging or growing. These are the sectors where there are most likely to be demands in developed economies for reactive/defensive industrial policy designed to slow or prevent structural change or to promote more orderly adjustment to competitive challenges from emerging economies.

6. Sectors where the home industry is still emerging but the world industry is in decline. There may be opportunities for developing countries to adopt strategic industrial policy here, but care is needed. If the industry is in decline because the global market for its product is disappearing altogether (as opposed to a situation where established players are losing market share to new competitors), then it would be an inappropriate target for developing country industrial policy, even if there appeared to be a comparative advantage.
7. Sectors where the industry is growing in the home economy but in decline on a world scale. Similar considerations apply as for Box 6, but Box 7 is perhaps more likely to correspond to developing country catch-up exploiting comparative advantage, as represented in Quadrant C of Figure 4. However, as with Box 6, the reasons for the decline of the global industry also need to be taken into account.

Discussion

In this section, we have introduced a new typology for industrial policy, based on the policy domain and policy orientation, and seen how industrial policy orientation can be mapped to the comparative maturity of home 'sectors' relative to the same sectors abroad.

In principle, it ought to be possible to categorise past experience with industrial policy and industrial strategy according to the terminology and taxonomy developed here. Examples might include:

- United Kingdom experience in the 1970s with ***protecting industries in decline*** such as shipbuilding, coal mining and automotive is an experience of a selective and reactive industrial policy that sought to work against the grain of the market, corresponding to box 5 of Figure 6. State ownership and state subsidy ultimately failed to arrest the decline of the protected sectors. Industrial policy of that era also sought to promote sunrise industries, and in those aspects, was more selective-strategic, tending towards Quadrant A of Figure 4. However, the consensus is that this too failed to deliver, partly because the focus was on technology push, with insufficient attention to commercial considerations or to fostering competition in the market place (BIS, 2012).

- ***Competitiveness strategies*** of the type followed by a number of OECD countries in the 1992-2007 period[16] put an emphasis on the framework conditions and the general improvement in the business environment. Such strategies came close to pure horizontal industrial policies, though some did contain sectoral elements, for example an emphasis on high tech, advanced manufacturing and knowledge-intensive business services. Such policies are close to box 4 of Figure 6.

- The categorisation of the industrial policy followed by ***Korea*** featured in the debate between Justin Lin and Ha-Joon Chang. Both agree that Korea's selective and strategic approach to industrial policy was a success. But Chang takes the view that Korea deviated from comparative advantage when it set up its first, state-owned, iron and steel company in 1968 and launched its Heavy and Chemical Industrialisation Programme in 1972, and did so again in 1983 when Samsung decided to design its own semi-conductors. Lin takes the view that Korea's approach was part of a comparative advantage conforming strategy, but one that recognised that comparative advantage evolved over time as the country accumulated capital on the basis of past successes.

- Korea's industrial policy is an example of one focused on manufacturing although in its most recent manifestation, more emphasis is being placed on services and the knowledge economy. Other countries that have formally adopted a ***manufacturing strategy*** recently include China,

India, Japan and South Africa. Such policies are by nature selective and may be considered strategic or defensive according to whether they are aimed at industrialisation (as in China or India) or averting the threat of deindustrialisation (as in Japan and South Africa). However, all four of these countries have a strategic element in their identification of industrial sectors, with Japan and China being particularly focused on seeking new areas of competitive advantage. The United Kingdom adopted a manufacturing strategy in 2002, refreshed in 2008 (BERR, 2009a), but this primarily horizontal approach was overtaken by the broader and more sectorally focused approach to industrial policy evident since 2009.

- Many countries, and the OECD itself, have adopted a ***Green Growth Strategy*** (whether explicitly in, for example, Denmark, Korea and Cambodia, or implicitly in many others, both OECD and non-OECD). Such strategies usually aim both to improve economic growth performance and to address the broader societal challenges posed by climate change and other pressures on natural resources and the environment. The approaches taken vary around the world, with some countries favouring a more horizontal approach, although this is a classic case of where even horizontal polices can have selective effects. For countries that are most actively pursuing a green growth strategy, the approach is essentially an example of selective, strategic, technology-focused industrial policies that seek new areas of competitive advantage, as represented in Quadrant A of Figure 4. Green growth is analysed in more detail in OECD (2011) and in Section 7 below.

- Many OECD and non-OECD governments have put in place measures both to support the ***automotive industry*** directly and to encourage car sales.[17] In a number of cases, governments have made their support conditional on the production of more energy-efficient cars, or they have provided direct incentives to consumers to purchase green cars, through car scrapping and replacement schemes. Although the main objective of public support during the crisis was arguably to provide a demand-side stimulus to the car industry and to the broader economy, these schemes also contribute to environmental goals and to the longer term development of the sector. In that sense they had both a reactive and a strategic element, in the terminology of Figure 3.

- Finally, in the United States, the *American Recovery and Reinvestment Act* of 2009 is one of many examples of policy introduced by OECD countries in ***response to the 2008-09 economic and financial crisis***. Many of the measures in such packages are aimed at delivering demand stimulus and addressing the financing problems at the heart of the crisis through interventions focused on the capital markets policy domain. While primarily horizontal and reactive in approach, most policy initiatives involved some selective element (for example a focus on energy, manufacturing and infrastructure in the *Recovery Act* package) and contained some longer-term strategic orientation as well as shorter term crisis support.

Other examples of industrial policy in practice are discussed more fully in Section 7 below. However, before concluding this discussion of types of industrial policy, the question arises of where ***New Industrial Policy*** fits in the proposed typology. This immediately brings up again the question of definitions – if 'industrial policy' itself is hard to define, then 'new industrial policy' is even more elusive. New industrial policy thinking has been prevalent in the development literature for some time but has only really come into prominence in developed economies since the crisis. As a result, participants come to the debate from very different perspectives.

However, one common feature of new industrial policy would be its greater emphasis on instruments based on improving systems, the final row of the typology set out in Table 4, and in particular interventions aimed at building networks, improving co-ordination and securing strategic alignment in the context of selective-strategic industrial policy. Although sectoral targeting is still used, there is perhaps a shift of focus towards tasks/activities and technologies, and there is certainly a move away from support

for single firms, and away from state aids, tariff protection and product market-focused interventions. The intention is to minimise and contain the risks of government failure. New industrial policy, particularly in a time of fiscal austerity, probably also relies less on market-failure correcting subsidies in factor markets. Finally, there has been some merging of the boundaries between strategic and defensive industrial policy – while policy makers have reacted to the crisis by adopting new industrial policy, and have naturally focused attention on where finance constraints and demand pressures have been felt most acutely, there have been many examples of measures being adopted that are more strategic in orientation.

We return to the question of what the typology introduced in this section means for evaluation priorities in Section 8. In the meantime, in the following section, we review the evidence on some of the early experience with new forms of industrial policy in OECD countries in four different policy areas.

7. Industrial policies in practice

While industrial policy has arguably worked in some countries and during certain periods, it has led to costly failures in other cases. In what way do recent policy developments reflect the current understanding of the potential role that selective industrial policies can play, both in advanced and emerging economies? In this section, we briefly review variants of selective policies that have been and are being adopted by OECD and non-OECD countries, including policies to foster clusters, attract foreign direct investment in a targeted way, and to develop green technology. We also explore public procurement as an example of a demand-side policy that may be considered as an example of a new form of industrial policy.

Cluster policies

'Clustering' is the tendency of firms in related lines of business to concentrate geographically. Policy initiatives to foster enterprise clusters are now common throughout OECD member and non-member economies, in wealthy and lagging regions, and in jurisdictions with both horizontal and selective approaches to industrial policy. Clusters policy often works across several different policy domains, but particularly land-based (e.g. enterprise zones and planning exemptions) and systems-based (e.g. cluster management companies and networking systems).

It is well documented that the agglomeration of firms and their suppliers can confer competitive advantage to the enterprises involved. For example, agglomeration can create locally concentrated labour markets, bring about specialisation and division of labour between firms (offering scale economies for individual firms), and attract buyers and sellers. The clustering of firms can also reduce the unit costs of technical services provided to members of the cluster. By operating in close proximity firms can also more easily subcontract to competitors any orders that exceed their own capacities, because proximity allows greater knowledge of the capabilities of potential contractors. This may allow firms to retain valued customers during peaks in demand. The clustering of firms can likewise facilitate the flow of ideas and information. Such flows occur formally and informally, for example when employees change employer, through contacts with common suppliers, and through social exchanges. Indeed, it is likely that frequent contacts between users and producers of capital goods have underpinned productivity growth in firms in many industrial districts. And locally overlapping commercial and social institutions can create a social network facilitating the reduction of transaction and other business costs. Furthermore, because factor costs are often similar if not identical for the cluster participants, competition may be driven by innovation.

Widespread policy interest in clusters and networks has been spurred by at least three considerations:

- **Productivity and innovation**: Policymakers are aware that membership of clusters can enhance firm productivity. For instance, studies by the Bank of Italy show job creation and return on investment in Italy's industrial districts to have all been consistently higher than elsewhere, even in periods of recession (Fabiani *et al*, 2000). In the United Kingdom and in Italy the location of firms in a cluster populated by innovating enterprises has been found to have a positive effect on the probability of innovating (Beaudry and Breschi, 2000).

- **Affluent area demonstration effects**: There are many examples of affluent regions whose economies are built on localised groups of firms. Such regions include parts of North-Central Italy, Bavaria in Germany, Cambridge and the M4 region in the United Kingdom, Silicon Valley and Route 128 in the United States and Sophia Antipolis in France. These examples have inspired local, regional and national governments to adopt policies based on enterprise clusters.

- **Enterprise creation**: The inter-firm specialisation permitted by some clusters enables individual entrepreneurs to start firms that concentrate on a highly specialised stage of the value chain in a given industry. In other words, a low degree of vertical integration in firms belonging to clusters might also lower barriers to entry for entrepreneurs.

While there are recurrent features to cluster programmes, there are also important differences. One area of difference is in the process of cluster identification and selection. Some programmes use detailed criteria – such as industry growth rate, multiplier effects, job creation and income potential, match with local resources or relationships with local suppliers. However, many other programmes use little rigour in the choice of target cluster. In fact, programmes often exhibit marked similarities in the selection of the sectors assisted, often being those in so-called 'sunrise' industries such as biotechnology, new materials, information technology and others.

Economic logic suggests that a policy towards clusters should be based on government supporting existing and emerging clusters rather than trying to create them *ab initio*. A 'comparative advantage-defying' policy aimed at developing entirely new groups of firms in selected sectors can entail high costs, high risks and give rise to destructive competition should many regions follow the same policies in pursuit of the same industries. Underlying programmes of cluster development is the idea that firms and industries are part of larger inter-linked systems involving market and non market exchanges. It is difficult therefore for governments to create and manage such complex systems through policy. Accordingly, there is a strong case for arguing that an indirect role for government in 'seeding' these networks is preferable.

There is another economic reason why an enabling role for government is appropriate. Sponsors of cluster development programmes sometimes express the view that public spending on cluster development is justified because it aims to create positive externalities. That is, cluster policies aim to correct market failure by encouraging the agglomeration economies referred to earlier. However, policymakers do not generally have the information with which to judge the magnitude of these effects in different industries and therefore whether the cost of the support given is justified by the potential benefits. Furthermore, diseconomies of agglomeration – say from congestion or pollution – may occur as clusters increase in size. So, beyond a given scale, a public subsidy of agglomeration might reduce overall welfare, and policymakers are unlikely to have the data with which to know when this occurs. Such considerations again suggest a non-distortionary and facilitative role for the public sector, rather than one in which government seeks to plan the creation and development of new clusters.

In line with the above observations and the systems focus of new industrial policy thinking, a policy on clusters might best seek to provide a framework for dialogue and co-operation among firms, the public sector (particularly at local and regional levels of government) and non-governmental organisations. This dialogue can lead to efficiency-enhancing collaboration between firms, such as joint marketing initiatives, mutual credit guarantee associations, the joint design and sponsorship of training and a more efficient division of labour among enterprises. Such a dialogue can also lead to an improved quality of policy and government action (such as in training, the provision of information, and infrastructure supply). Policymakers can lock in some of the benefits of existing or embryonic clusters by ensuring suitable institutional conditions. For example, actions such as promoting the establishment of suppliers' associations and learning circles, facilitating contacts among participants in the cluster, facilitating subcontracting arrangements within the cluster, and ensuring effective extension services can all increase the benefits to firms of belonging to a cluster. Firms should have access to such institutional arrangements whether they belong to a cluster or not. However, it is likely that the benefits of such arrangements will be magnified by cluster membership, and the cost-effectiveness of provision may be greater when supplying to a clustered rather than a dispersed group of firms.

Investment promotion

The (potential) beneficial impacts of foreign direct investment (FDI) for host countries are widely recognised: expansion of productive capacity, job creation, human capital enhancement, innovation and technology diffusion, and enterprise development. Because of their superior organisational practices, capital and technologies, multinational enterprises (MNEs) may augment local capabilities in host countries. In addition, unintended benefits might spill over from MNEs to local firms and result in productivity growth for the host economy. Given that these externalities are not reflected in market prices, government intervention may be justified to correct for this market failure and may result in a more efficient location of firms across countries (Glaeser, 2001).

Almost all governments nowadays have policies in place to attract international investors. Countries increasingly target international investments in high technology manufacturing industries such as electronics, telecommunications equipment, pharmaceuticals, aerospace and automobiles and in knowledge-intensive services such as business services and telecommunications. Countries also increasingly take into account the growing international fragmentation of value chains and also implement a more functional ‘task-based’ approach by prioritising R&D laboratories, or headquarters and other decision centres.

Investment promotion aims to create an attractive image for a country as an investment location largely by disseminating more or less targeted information and by providing investment services for prospective investors. The rationale for investment promotion is based on the existence of information asymmetries that could prevent the efficient allocation of investments across countries. International investors typically do not have perfect information about all countries and investment opportunities and can face large costs in gathering the necessary information. As a result, they often consider only a small range of potential investment locations (mostly the ones they are familiar with) and are rather reluctant to consider new ones

As a result of increasing policy competition, countries are also sometimes willing to offer direct incentive packages to individual investors. While there exists a wide range of different incentives implemented by governments, three broad categories can be distinguished (Faeth, 2009): fiscal incentives (e.g. tax exemptions and credits), financial incentives (e.g. grants and subsidies) and other incentives (e.g. subsidised services and infrastructure, or preferential treatment).

Notwithstanding the acknowledged market failures (information asymmetries and technology spillovers), there is a great deal of political debate as to whether this use of public money is economically justifiable. The empirical evidence and theoretical basis for support is mixed (Glaeser, 2001). Some critics argue that government is distorted by lobbying and officials' private interests and that consequently the costs to the host economy are larger than the benefits (Greenstone and Moretti, 2003).

A key issue concerns the expected benefits of foreign direct investment by MNEs. FDI is indeed considered to be one of the most important channels through which technology is transferred across countries. By encouraging MNEs to establish local facilities, governments hope to bring about the transfer of technology to local firms. But while spillovers might be expected from a theoretical point of view, they do not occur automatically and might not materialise in reality. The empirical literature on the presence of spillovers is at best mixed: the need for complementary policies has been demonstrated, e.g. improving the absorptive capacity of domestic firms.

The second issue relates to the typical informational constraints governments face in designing industrial policy. It is for example hard for governments to decide the appropriate level of incentives, as the measurement of spillovers *ex ante* is problematic. Reliable calculations of future benefits are typically lacking and the empirical measurement of spillovers is necessarily indirect. Governments often use a rough accounting approach by calculating the (expected) number of jobs gained and the cost of the incentive packages to companies, in order to come up with an indication of the rate of return on public money. Calculating the (exact) value of externalities is however important since government action may not be welfare improving if the investment incentives do not correctly reflect the value of the externalities. Furthermore, calculations of expected benefits are rarely verified *ex post* (Greenstone and Moretti, 2004).

Implementation challenges arise not only in determining the level but also choosing the form of government incentives for international investors. The type of incentive offered to potential investors (employment incentives, R&D incentives, training incentives) is of course directly related to the objectives of the investment promotion policy. Should the incentive(s) be across the board and thus available to all international investors or rather discretionary and apply only for specific investments that meet some requirements? What criteria should be used to allocate incentives? Should the incentives be paid up-front or should they be made dependent on the realisation of specific commitments (in terms of investment spending, employment, R&D undertaken locally)?

Some studies have analysed whether investment promotion policies succeed in attracting higher volume of FDI, since the substantial government outlays on investment promotion (estimates suggest that worldwide more than USD 1 billion is spent) have attracted considerable public attention. While the cost of incentive packages is relatively easily to calculate, the non-pecuniary elements of investment promotion, like information dissemination, co-ordination and facilitation, are much harder to capture. Nevertheless some studies have shown that investment promotion is positively correlated with larger FDI inflows. And some recent empirical work has shown that industry targeting has resulted in larger FDI inflows (Charlton and Davis, 2007; Harding and Javorcik, 2007).

Some negative effects of government intervention have also been reported in the literature. There is for example some evidence suggesting that incentives may divert investments from one region to another within a country, or from one country to another within a geographic area. In addition, some research has suggested that granting incentives to investors may trigger rent-seeking behaviour among investors.

Public procurement

In recent years, interest has grown in a number of OECD countries in using public procurement as a tool for fostering innovation. The motivation for using procurement in this way reflects a number of factors:

- Because of their purchasing power, governments can shape innovation directly and indirectly. Firms benefit because procurement can help them recuperate the sunk costs of large and sometimes risky investments over a pre-determined period of time. And by creating a signalling effect as a lead user, governments can also influence the diffusion of innovation.

- Public sector demand may help to counter problems in access to finance that can particularly affect small firms. The use of competitive tendering in the awarding of a contract, and the fact that a public agency has evaluated information on tender-winning firms, might also serve to attract additional finance from private sources for innovative activities.

- Demand-side initiatives might be particularly effective in stimulating issue- or mission-oriented innovation by creating a market for technology in areas where there is a time-bound need to meet a societal challenge, such as population aging, health and the environment.

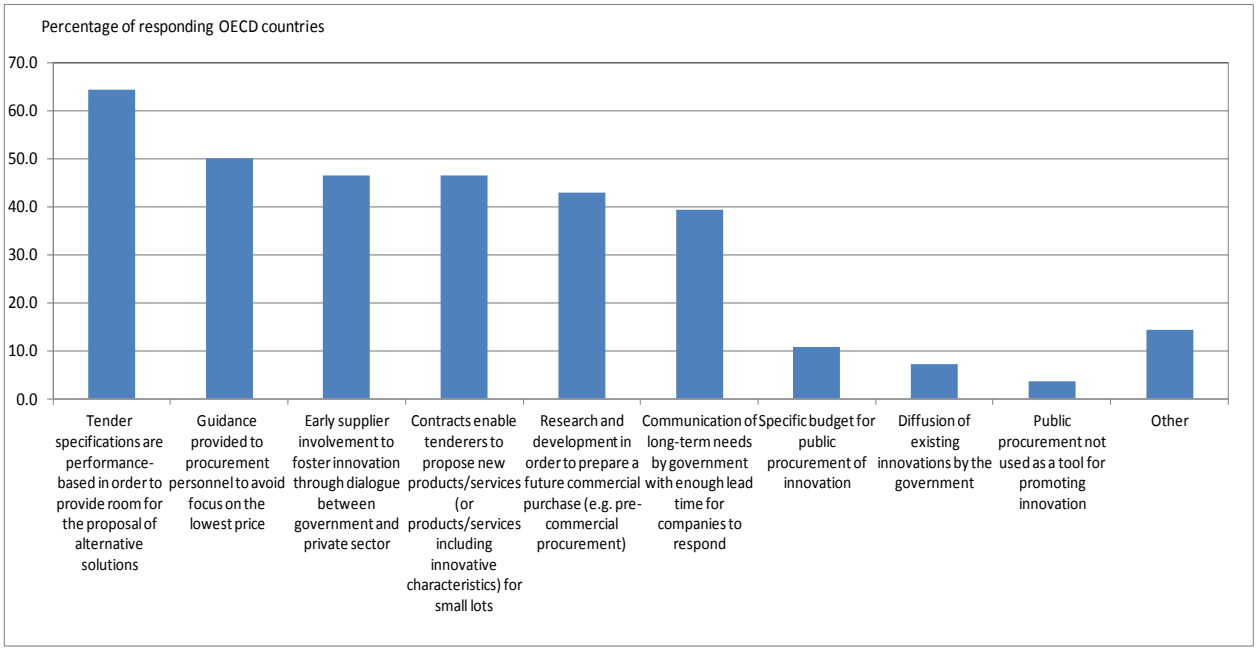
- The delivery of essential public services can become more cost-effective as targeted innovation proceeds. In addition, given the pressing financial circumstances facing most OECD governments, there is an attraction in the possibility that well-designed demand-side policies might be less expensive for governments than direct support measures.

- Interest in demand-side initiatives may also reflect some degree of disappointment with the efficacy of traditional supply-side measures. Another appealing feature of demand-side policies is that they are not necessarily directed at specific firms, but may instead be designed to reward innovation and efficiency wherever they arise.

The concept of fostering innovation through procurement is not new and some countries have pursued active technology procurement policies for decades. Public procurement has for instance been instrumental in the emergence of various high-tech sectors in the United States, Japan and France. However, the potential of public procurement has received renewed impetus. For instance, the United Kingdom has actively sought to integrate procurement for innovation across government since 2003. And Germany has created a new Agreement on Public Procurement of Innovation by which six federal ministries will promote innovative procurement.

The potential for use of innovation procurement has also been highlighted in a number of European Union reports, including the Industrial Policy Flagship, which proposes targeted actions in standardisation, regulation and public procurement to boost the innovation performance of specific sectors, such as construction, security industry, space, key enabling technologies, and bio-based products (European Commission, 2010). Across the OECD, most countries are seeking to use procurement for innovation using a variety of hard and soft instruments (Figure 7).

Figure 7. Use of procurement to promote innovation



Source: 2011 OECD Survey on Reporting Back on Procurement Recommendation (OECD, 2012)

Four levels of public procurement can be distinguished:

- *General government procurement* is where innovation-related criteria are incorporated in tender specifications and assessment. Innovation-oriented public procurement can be implemented in this way for a vast number of products and services purchased by public authorities, from construction, transport, energy and catering services, to health products and equipment.

- Second, *catalytic procurement* is where the government plays a role in strengthening demand for products and services that are still in an early stage of development or diffusion. Government purchases may provide firms with early market support and may act as a signalling device – a recent example is the purchase of electric vehicles for government use.

- Third, *pre-commercial strategic procurement* is aimed at purchasing research and development, design, prototyping and testing services for products or services that do not yet exist on the market. The United States follows this model in programmes in sectors such as defence, energy and transport. For example, the Defense Advanced Research Projects Agency (DARPA), has been responsible for developing technologies such as the Internet, the global position system, and the laser. The US Small Business Innovation Research (SBIR) Programme, and similar initiatives in European countries such as the Netherlands and the United Kingdom, also aims to stimulate R&D through procurement from small businesses.

- Finally, *commercialisation programmes*, such as Australia's Boosting Highly Innovative SMEs initiative, aim to go beyond the stage of developing the supply side into the commercialisation of products to meet a defined (public) user need.

The use of public procurement to stimulate innovation involves a number of challenges. The design of pro-innovation procurement mechanisms, as with traditional procurement, must avoid the risk of capture by large firms and/or other anti-competitive effects. Innovative public procurement is far more challenging for OECD countries with decentralised procurement systems. Furthermore, many agencies with responsibilities for public procurement operate separately from line ministries or government agencies that have a remit to foster innovation. Specialised procurement agencies are also mainly responsible for the efficiency of purchasing, and expertise in innovation may be lacking.

A further consideration is that the procurement of innovation entails a number of distinct risks beyond those incurred in traditional procurement. These specific risks include: technological risk – that is, non-completion risk stemming from technical features of the good or service to be procured; risks related to the uptake of the good or service; and market risks, both on the demand and supply side. Options exist for at least partially mitigating all of these risks. For instance, problems of technological risk can be mitigated in contract design by using cost-reimbursement or incentive contracts. Another mitigation strategy is to use framework agreements or multi-stage procurement processes.

Generally, demand-side policies have been under-evaluated compared to other categories of innovation support. This reflects the technical challenges of such evaluation, the relative novelty of demand-side policy, the fact that some demand side policies are not entirely comparable to spending programmes that have a schedule of deliverables and a budget (Edler *et al*., 2012) and data constraints. In particular, there have been almost no systematic assessments of innovation-oriented public procurement and more needs to be done to improve the evaluation evidence base for demand-side policy.

One area where some evaluation work has been undertaken is the Small Business Innovation Research (SBIR) programme, first introduced in the United States in 1982, and taken as the inspiration for a number of similar schemes elsewhere. The rationale for such schemes reflects the fact that innovative small firms often face difficulties in attracting investors to support their innovation projects - especially at the seed stage. From the government's perspective, SBIR-type programmes have a double aim: to stimulate technological innovation, while providing government agencies with cost-effective solutions to their needs.

Some evaluation studies have shown that, in the United States, SBIR funding has led to increased growth and employment creation and a greater likelihood of attracting venture financing (Lerner, 1999), although other analysts have cast doubt on the additionality of SBIR impacts (Wallsten, 2000). One concern with such programmes is that government funds might crowd out privately-financed R&D. Schemes should finance proposals not likely to receive funds from private sources if additionality is to be maximised. Bound and Puttick (2010) examine whether the United Kingdom's Small Business Research Initiative (SBRI) is helping to stimulate innovation. The assessment does not afford an impact assessment, but does offer qualitative insights on performance that could also be evaluated quantitatively later. The evaluation found that through the programme government departments have been able to widen the search for solutions. For instance, in response to a need in the National Health Service for better detection of drug-resistant pathogens and improved hand-cleaning among staff, a small company was able to bring to bear technology originally developed in the food processing industry. It was also seen that the SBRI offers credibility for potential follow-on investments from the private sector.

Various qualitative assessments of technology procurement programmes have highlighted the importance for success of certain administrative features, including for instance whether procurers are able to develop in-house technology-related competencies or have legal authority to contact potential suppliers to learn about technological possibilities.

Fostering green growth

A fourth example of industrial policies in action is green growth. As we have seen, many countries around the world are adopting a package of horizontal and selective policies along the lines set out in the OECD Green Growth Strategy report (OECD, 2011). Previous OECD and IEA work has pointed to the role that direct support for technologies and business innovation might need to play in fostering green innovation. In certain markets for green innovation, such as energy and transport markets, the presence of 'lock-in' to dominant designs can create entry barriers for new technologies due to, for example, the high fixed costs of developing new infrastructure. Moreover, there are still considerable uncertainties about the prospects for success and the long timescales for infrastructure replacement and development. This may be a particularly important barrier in the energy sector, where the high capital costs of investment tend to make investors risk averse as regards new technologies.

Such barriers cannot be easily overcome by reliance on approaches that correct for the key market failure affecting the market for green innovation, e.g. through carbon pricing. More directed support in other policy domains may also be needed. In this area, as in others, the design of schemes to provide direct support is of great importance. Good policy design should ensure competitive selection processes, contain costs and select projects that best serve public policy objectives, without favouring incumbents or providing opportunities for lobbying. Rigorous evaluation of policy impact is also essential.

Where governments should direct their support is a difficult issue to resolve. In giving selective support, there is always a risk of deadweight, but in the case of energy infrastructure, there is also the risk that more appropriate technologies or practices will emerge that should have been supported but policy has locked the economy into a less desirable pathway. On the other hand, providing too little support, or providing it too late, can preclude the achievement of environmental objectives. In many cases, such as driving low carbon growth or decarbonising energy systems, large scale system-wide changes need to happen in a relatively short space of time.

This points to the need for a portfolio of public investment where funding approaches are tailored to the different stages of technology development. In general, policies for innovation and deployment need to encourage experimentation to develop new options that can help strengthen environmental performance at the lowest cost. This should involve a vigorous process of national and global competition among alternative technologies and innovations to identify the options that produce the best results. Governments should level the playing field between alternative options, but should in general avoid supporting specific technologies and solutions over others, emphasising competition and technology neutrality.

Against a background that no single technology or policy will drive green innovation, Dutz and Pilat (2012) recommend that countries should use a combination of supply- and demand-side policy instruments to achieve policy goals, which may differ from country to country. Policies to foster green innovation will be successful if they improve the performance of the innovation system as a whole, by addressing as a priority weak links in the system. In all countries, the priority assigned to different elements depends on the nature and state of the system: one size does not fit all.

Whether by design or default, countries make different choices in their mix of policy instruments to support innovation. The appropriate policy settings and policy tools will depend on each industry's capacity for innovation, and notably on whether it is involved in innovation at the frontier, in fostering incremental innovation and adopting technologies from abroad, or in building its local capabilities for innovation (Table 5).

Table 5. Policies to foster green innovation

Policy focus	Policy instruments
Promoting frontier innovation (overcoming technological roadblocks, fostering radical innovation, overcoming resistance by incumbents, and scaling up new inventions)	• Investment in public R&D, including thematic and mission-oriented research • Support for early-stage development • International co-operation • Technology prizes • Demand-side policies, such as public procurement, standards and regulations • Front-runner approaches to enable new business models • Regulatory reform and competition policy • Protection and enforcement of intellectual property rights
Promoting catch-up innovation (fostering access and take-up of existing technologies, enhancing efficiency, promoting incremental innovation)	• Taxes and market-based instruments to price externalities and enhance incentives • R&D support, tax incentives • Adoption incentives/subsidies • International co-operation • Co-investment funds • Open trade and investment policies • International mobility of researchers and innovators • Protection and enforcement of intellectual property rights • Voluntary patent pools and collaborative mechanisms
Building innovation capabilities (developing capabilities to absorb knowledge and foster innovation)	• Taxes and market-based instruments to price externalities and enhance incentives • Education and skills development • Improving the business environment • Linking to global networks and knowledge • Improving infrastructure • Improving governance

Source: Dutz and Pilat (2012), based on OECD (2011) and Dutz and Sharma (2012)

Another dimension to industrial policies in the green growth area is how governments can best ensure that their country can capture value from green innovation at the national, regional and local levels. In a highly interconnected global economy, firms and governments will need to make choices and establish priorities for areas in which they can achieve excellence and critical mass. Local strengths, such as human capital, firms, knowledge institutions and networks, well-developed local services, social factors and job opportunities, are the key to developing local clusters of activity and to attracting firms, including multinational firms, and talent to specific locations and countries. These are also the foundation on which collaboration with other firms and countries can be built, and strategic and selective choices have to be made.

In general, countries will be placed differently in how they can best derive benefit from the global transition to a green economy. Some countries will be well placed to develop, commercialise and produce green technologies, sometimes for the global market. Others may choose to be earlier adopters of new technologies and innovations. Existing capabilities and policies to foster new capabilities will be important determinants of the choices that policy makers make in this context, *i.e.* where to develop and where to deploy green innovations.

Good evaluation evidence would also help policy design but, as in other areas, there is a dearth of rigorous evaluation. Reviewing the evaluation evidence, Dutz and Pilat (2012) conclude:

> "Unfortunately, very few policies have been analysed to figure out what the impact of the policies is in terms of overall benefits relative to costs or to alternate expenditures of scarce policy resources. There is an urgent need for well-designed impact evaluations of specific policy interventions. Both experimental impact evaluation with randomised controlled trials and quasi-experimental evaluation of existing interventions are needed, particularly to learn about the effectiveness of different policies to promote both radical innovation and broader absorption of existing green technologies."

8. The need for more evaluation – what can be learned?

Although lessons can be learned from the study of specific examples of industrial policy in practice, the empirical evidence regarding the experience and impacts of industrial policy is mixed and much of it is focused on developing and emerging countries. Case study evidence lends some support to the validity of industrial policy and its success, but there are also many well-documented instances of policy failure, for example during episodes of import-substituting industrialisation. Only a few econometric studies report positive impacts of industrial policy (Rodrik, 2008; Naudé, 2010a). The largest problem in empirical work is to assess the behavioural additionality of policies and to analyse if the (industrial) policy itself was truly responsible for the final outcome. For example, while evidence exists of successes associated with industrial policy in some East Asian economies, there is disagreement about the extent to which the economic and industrial achievements of these countries can be wholly attributed to industrial policy.

A common theme in the literature is that there has been insufficient systematic evaluation of industrial policy and therefore an inadequate evidence base on which to assess its effectiveness. Governments rarely evaluate the costs and benefits of industrial policy properly and, even if they do, the results often come too late to influence the design of policy, or the lessons are not learned for future policy design. Lerner (2009), for example, laments the "systematic failure to undertake careful evaluation" of entrepreneurship and venture capital programmes across the world. Impact evaluations tend to be of the use of specific instruments of industrial policy – formal evaluations of a package of measures, or of an industrial strategy, are even rarer.

With evaluation evidence at best partial, and sometimes contradictory, it is perhaps not surprising that a bi-polar view of the success of industrial policy has emerged, with many mainstream economists and commentators denouncing a policy of 'picking winners' as not being the role of government, while others take a much more optimistic view of the likely success of industrial policy. The truth is likely to lie somewhere in between, with risks on both sides and possibilities for successful intervention in the right circumstances, though not to the extent claimed by the more enthusiastic supporters of industrial policy.

Although not a formal evaluation, Rodrik (2008) attempts to distil some of the key lessons to be learned from the experience to date. He starts from an acceptance that, as we have seen, while a market failure or systems failure rationale for policy can usually be identified, the practical problems of policy design and implementation often require capabilities and information that governments do not have. Moreover, the very process of selective industrial policy is seen by some as an invitation to corruption and rent-seeking. In order to maximise the chances of success in policy implementation, Rodrik identifies three key features that governments need to incorporate in the design of industrial policy.

The first is what he calls ***embeddedness,*** based on the concept of 'embedded autonomy' developed by sociologist Peter Evans in the early 1990s (Evans, 1995). This design feature aims to address the information asymmetry between governments and firms. The argument here is that governments often only have a vague idea of whether an activity is deserving of support or not, and how to shape private sector responses to government policy. To design effective industrial policy, governments need to discover and elicit more information about the constraints that markets face, which typically requires close and strategic co-operation between the government and the private sector. Advisory councils and public-private

partnerships are among the approaches that governments can use,[18] all intended to help a process of discovery of the key constraints to growth and development. In this respect, the approach puts the emphasis on instruments of industrial policy that fall into the systems and institutions domain of the typology set out in Table 4.

The second design feature of industrial policy discussed by Rodrik is that governments need to use both ***carrots and sticks***. Firms need to be able to earn rents from investment in innovation and entrepreneurship. At the same time, these rents should be temporary and eroded by competition. Industrial policy needs to encourage firms to invest (with the prospect of reaping the returns to that investment), but should also weed out those projects, firms and investments that fail. In practice, this implies that policies need to have very clear criteria for success and need to be accompanied by features such as conditionality, sunset clauses, programme review, monitoring, benchmarking and periodic evaluation. This also implies a willingness to tolerate some failure rate: "*The appropriate question therefore is not whether a government can always pick a winner – it shouldn't even try – but whether it has the capacity to let the losers go*." (Rodrik, 2008). Indeed, well-designed public support should help to amplify and build on market dynamics.

The third feature of industrial policy recommended by Rodrik is ***accountability,*** and in particular the need for clear lines of accountability for success and failure in the conduct of industrial policy. Monitoring and accountability could take the form of regular reporting on targets and achievements, together with explanations for deviations from planned outcomes. Transparency would also be an important feature of such policies, which would imply a high degree of openness in discussions between government and business, transparent public accounting of expenditures and government assistance programmes and openness of such programmes to new entrants, as opposed to capture by vested interests.

While these and other lessons can be drawn from past experience, there are still huge gaps in the evidence base. The resurgence of interest in industrial policy offers an opportunity to make a start on improving the situation. The 'natural experiment' of the response to the 2008-09 economic and financial crisis is an opportunity to study how effective policy has been in the particular circumstances of the last few years. There has also been a renewed interest in cost effectiveness evaluation studies, given the severe fiscal constraints faced by most OECD member country governments. Coinciding with the growing availability of micro data and advances in evaluation methodology (see, for example, Glennerster, 2012), there is a real opportunity to improve the evidence base in this critical area.

Against this, evaluation budgets may come under pressure in a time of austerity, as resources are focused on front-line services. But there are some encouraging signs. For example, in the United States, the *American Recovery and Reinvestment Act* of 2009 contains unprecedented accountability and transparency provisions, including a requirement on the Council of Economic Advisers (CEA) to provide Congress with quarterly reports on the effects of the Recovery Act on overall economic activity, and on employment in particular (CEA, 2011). Also in the United States, the Office of Management and Budget (OMB) announced in 2009 a major government-wide initiative to fund rigorous evaluations in federal social, educational, and economic programme areas. The *Coalition for Evidence Based Policy* in the United States and the *Alliance for Useful Evidence* in the United Kingdom are also pressing their governments to strengthen the use of evaluation and other evidence to improve policy making. The *Growth Policy Institute* in Sweden and the *Central Planning Bureau* in the Netherlands also perform the function of holding government departments in their respective countries to account on evaluation evidence.

There is of course a risk that the policies implemented in response to the 2008-09 crisis are highly specific to the economic and financial circumstances of the time and the impact of these policies might be quite different at a different stage of the business cycle or in different institutional settings. This might be true of some of the interventions designed to relieve the short term pressures on the economy following the

banking crisis, or measures designed to address employment problems arising from the downturn. Care needs to be exercised in drawing lessons from policies implemented in conditions of financial stress and under-employed resources. Results from the evaluation of reactive policies aimed at relieving short-term financing pressures may tell us little about how such polices will work in 'normal' times.

But not all interventions were reactive short-term measures of this type. Others were longer term and more strategic in nature and the lessons that can be learned from these are more likely to be of value to future policy design. Even in these cases, evaluation must be done carefully, as the impact of strategic polices introduced at a time of recession may still work partly through aggregate demand or signalling effects that would not be present once the economy has returned to equilibrium. However, at a minimum, demonstration of impact would tell us something about the potential usefulness of such policies, if there were ever to be a repeat of the economic and financial crisis. Furthermore, failure to demonstrate impact might tell us something about the likelihood of success in more normal times.

Moreover, whether policies in response to the economic and financial crisis are reactive or strategic, there are lessons to be learned from both, even if the evidence of impact is *not directly* applicable to future programmes. The use of evaluation evidence can be *instrumental*, in the sense of a linear or closed loop process, with implementation of a policy being followed by monitoring, evaluation and feedback into the next stage of policy making.[19] Or it can be *conceptual*, where research results are used in less specific, more indirect ways to build the evidence base. Evidence from the experience with crisis response measures may still be useful in the conceptual sense even if their instrumental use is limited. Lessons can also be drawn from other aspects of the policy response to the crisis. For example, the implementation of future policy measures can be informed by evidence from *formative* or *process* evaluations that relate to how the policy was delivered, including participants' perceptions of how the policy operated, factual data on delivery and other administrative data.

Where are the main gaps in the evaluation of industrial policy in terms of the framework and typology introduced in Section 6? Although we have defined industrial policy broadly, we are not arguing that evaluation priorities should be similarly wide-ranging. There is little point in an industrial policy research programme that focuses on evaluating the impact of horizontal measures such as improving competition policy, opening up trade and investment, or macro-financial stabilisation – research in these areas is being pursued elsewhere. Rather the focus of industrial policy evaluation should be on selective industrial policies, the right hand side of Table 4 and Figure 3. It should include both reactive and strategic policy but distinguish clearly between lessons that are specific to the crisis response and those that are of more general applicability. In general, evaluation will be easier if focused on specific instruments of industrial policy, some of which were listed in Table 4. However, in many cases, a combination of policy instruments will be required to secure an industrial policy objective. In such circumstances, it will be important to take into account the full range of interventions and the need for policy coherence in evaluating impact.[20]

Perhaps the greatest challenge for industrial policy evaluation, and the biggest gap in the literature, is the evaluation of broad industrial strategies. This may be more a job for the economic historian than for econometricians or evaluation specialists. But there is a general need for more systematic quantitative or qualitative review of the experience of industrial strategies in OECD economies. The resurgence of interest provides an opportunity to put plans in place to improve the evidence base.

9. Concluding comments

This paper has reviewed the evidence on emerging thinking and new trends in the sphere of industrial policy. It is clear that there has been a renaissance of interest in industrial policy, a trend which began in developing countries some time ago but has been taken up more recently by developed economies. In part, this was in response to the onset and nature of the 2008-09 economic and financial crisis and by the need to find new sources of growth and employment, but it also reflected longer term concerns about the decline in manufacturing as a share of GDP, the challenge of competition from emerging economies, and the erosion of the 'industrial commons'.

In reviewing the variety of definitions of 'industrial policy' used in the literature, we adopt a broad and inclusive definition, namely:

> ".. 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,"

Starting from this definition, the paper proposes a new typology based on the orientation of policy and the policy domain. Thus, the orientation of industrial policy can be *horizontal* or *selective*, though it is recognised that some so-called horizontal policies can be selective in either their implementation or their impact. Selective policies can be designed to focus on certain *sectors*, *technologies* or *'tasks'* (stages in the value chain) or some combination of all three. Active industrial policies of this type can be either *strategic* or *defensive/reactive*. While both address the challenges of the economic environment, defensive/reactive policies tend to be driven by shorter-term considerations and may be more prone to political influence. Such policies are more likely to be successful if there is robust evidence of market failure, appropriate conditionality and a clear exit strategy. More strategic approaches to industrial policy can be characterised according to whether they are *comparative advantage-following* or *comparative advantage-developing* (or, equivalently, whether comparative advantage is *open* or *latent*), and according to whether the country or industry is in *catch-up* mode or at the *frontier*. This two-way classification offers some insight into approaches to industrial policy for sectors and technologies at different stages of maturity and for countries at different stages of development. One lesson that emerges is that one size does not fit all.

Looking at a typology according to the policy domain, the paper proposes a framework based on growth accounting, distinguishing instruments of industrial policy according to whether they operate mainly on product markets, on factor markets, or on the systems and institutions needed to bring agents together and to co-ordinate across markets. This categorisation neatly parallels the evolution of thinking (traced in Section 5) about the rationale for industrial policy interventions, which has moved from a traditional approach based largely on product market interventions (production subsidies, state ownership, tariff protection), through market failure-correcting taxes and subsidies operating mainly on factor markets (R&D incentives, training subsidies, investment allowances, help with access to finance) to a focus on interventions that help build systems, create networks, develop institutions and align strategic priorities.

Recent developments in both the theory and practice of industrial policy suggest that it is possible to find a theoretical rationale for a government role and these arguments have if anything been strengthened by the economic crisis. However, there are important practical difficulties, not least the risk of government failure, including the considerable information requirements, the risk of rent-seeking behaviour and the potential use of industrial policies for protectionist goals. Unless these problems are addressed, traditional approaches to industrial policy seem destined to fail, and the historical record has not been kind.

So, what can governments do 'beyond industrial policy', in order to avoid the mistakes of the old-fashioned, selective-reactive, product market-subsidy focused variety of industrial policy? 'Horizontal' measures are still the preferred way forward but it is recognised that there may be some aspects of policy where strategic choices need to be made. The emerging consensus is that the risks associated with selective-strategic industrial policy can be minimised through a 'soft' form of industrial policy, based on a more facilitative, co-ordinating role for government, consistent with the systems approach described in this paper. The goal of 'soft' industrial policy is to develop ways for government and industry to work together to set strategic priorities, deal with co-ordination problems, allow for experimentation, avoid capture by vested interests and improve productivity. While not immune to the dangers of government failure, such an approach, if carefully designed and implemented, has a much higher chance of success than the costly and distortionary selective-defensive industrial policy interventions of the past. The paper explores some recent initiatives on clusters policy, investment promotion, public procurement and green growth, all of which attempt to reflect elements of the new thinking in their approach.

One clear message to emerge is the need for much better monitoring and evaluation of industrial policy initiatives. Many reviews draw attention to the lack of systematic evaluation evidence, particularly for the type of intervention adopted in OECD countries. Transparency, monitoring and evaluation and sharing of lessons across policy areas and between countries will help avoid pitfalls in the future. At a time when many OECD countries have put in place policies to promote new sources of growth through supply side measures, against a background of fiscal restraint, there is an urgent need for policies to be carefully evaluated against a consistent framework. Ideally, planning for monitoring and evaluation should begin at the time policy is being formulated.

In deciding evaluation priorities, the focus should be on selective policies and include both reactive and strategic measures, distinguishing lessons specific to the crisis response from those of more general applicability. There is also a particular need for more evaluation of industrial strategy, or packages of measures, as well as the more traditional focus on specific instruments. This will require an eclectic approach and is likely to involve a mix of both quantitative and qualitative research, to which the OECD is well placed to contribute.

BIBLIOGRAPHY

Adams, F.G., and L.R. Klein (1983), *Industrial Policies for Growth and Competitiveness*, Lexington: Lexington Books.

Aghion, P., J. Boulanger and E. Cohen (2011), "Rethinking Industrial Policy", *Bruegel Policy Brief*, 2011/4, June 2011.

Aiginger, K. (2007), "Industrial Policy: A Dying Breed or A Re-emerging Phoenix?" *Journal of Industry Competition and Trade* (2007) 7:297–323.

Aiginger, K. and Sieber, S. (2005), "Towards a renewed industrial policy in Europe, Background Report of the Competitiveness of European Manufacturing", Prepared as Chapter 1 for the Background Report of the Competitiveness of European Manufacturing, European Commission, DG Enterprise.

Andreoni, A. (2011), "Productive Capabilities Indicators for Industrial Policy Design", UNIDO Development Policy, Statistics and Research Branch, Working Paper 17/2011.

Audretsch, D.B. and P.E. Stephan (1996), "Company-scientist locational links: The case of biotechnology", *American Economic Review*, 86 (3), pp. 641-652.

Baldwin, R. and S. Evenett (2012), "Value Creation and Trade in 21st Century Manufacturing: What Policies for UK Manufacturing?" in D. Greenaway (ed.), *The UK in a Global World: How can the UK focus on steps in global value chains that really add value?*, London: BIS, CEPR and ESRC.

Baldwin, R. and F. Robert-Nicoud (2007), "Entry and Asymmetric Lobbying: Why Governments Pick Losers", *Journal of the European Economic Association*, vol. 5(5), pp. 1064-1093.

Beath, J. (2002), "UK Industrial Policy: Old Tunes on New Instruments?" *Oxford Review of Economic Policy*, Vol. 18, No. 2.

Beaudry, C. and S. Breschi, (2000), "Does 'Clustering' Really Help Firms' Innovative Activities?" http://www.cespri.uni-bocconi.it/papers/wp111.PDF

Beffa, J.L. (2005)," Renewing Industrial Policy". Paper commissioned by the French Government, 15 January 2005.

Berger, A.N. and G.F. Udell (1992), "Some Evidence on the Empirical Significance of Credit Rationing", *Journal of Political Economy*, Volume 100, Number 5, pp. 1047-1077.

BERR (2009a), *Manufacturing: New Challenges, New Opportunities*, London: Department of Business, Enterprise and Regulatory Reform and Department for Innovation, Universities and Skills.

BERR (2009b), *New Industry, New Jobs*, London: Department of Business, Enterprise and Regulatory Reform.

BIS (2009), *The UK Strategic Investment Fund: Interim Report*, London: Department for Business, Innovation and Skills.

BIS (2012), "Industrial Strategy: UK Sector Analysis", *BIS Economics Paper No. 18*, September 2012.

BIS and HM Treasury (2011), *The Plan for Growth*, London: Department for Business, Innovation and Skills and HM Treasury.

Bound, K. and R. Puttick (2010), "Buying Power? Is the Small Business Research Initiative for procuring R&D driving innovation in the UK ?" Research report, June 2010, National Endowment for Science, Technology and the Arts, United Kingdom.

Brander, J.A. and B.J. Spencer (1985), "Export Subsidies and International Market Share Rivalry", *Journal of International Economics* 16 (1985), pp. 83-100.

Bravo-Biosca A., C. Criscuolo and C. Menon (2012), "What drives the dynamics of business growth?" *OECD Science, Technology and Industry Working Paper*, forthcoming.

Cable, V. (2012a), "Industrial Strategy: Next Steps", speech given at Institute for Public Policy Research, London, 27 February 2012.

Cable, V. (2012b), "Industrial Strategy", speech given at Imperial College, London, 11 September 2012.

Caves, R. E. (1987), "Industrial Policy and Trade Policy: the Connections", in H. Kierzkowski (ed.), *Protection and Competition in International Trade: Essays in Honour of W.M. Corden*, Oxford: Blackwell.

CEA (2011), "The Economic Impact of the American Recovery and Reinvestment Act of 2009, Eighth Quarterly Report", 9 December 2011. http://www.whitehouse.gov/sites/default/files/cea_8th_arra_report_final_draft.pdf

Chang, H-J. (1994), *The Political Economy of Industrial Policy*, New York: St. Martin's Press.

Chang, H-J. (1997), "Evaluating the Current Industrial Policy of South Africa". University of Cambridge, Department of Economics, processed.

Charlton, A. and N. Davis (2007), "Does Investment Promotion Work?" *The B.E. Journal of Economic Analysis and Policy*, Vol. 7, No. 1, pp. 1-19.

Cimoli, M., G. Dosi, R. Nelson, and J. Stiglitz (2009), "Institutions and Policies Shaping Industrial Development: An Introductory Note", in M. Cimoli, G. Dosi and J.E. Stiglitz (eds.), *Industrial Policy and Development: The Political Economy of Capabilities Accumulation*, Oxford: Oxford University Press.

Ciuriak, D. (2011), "The Return of Industrial Policy". http://ssrn.com/abstract=1929564

Crafts, N. (2010), "Overview and Policy Implications" in "Learning from some of Britain's Successful Sectors: An Historical Analysis of the Role of Government", *BIS Economics Paper No. 6*, March 2010.

Curzon-Price, V. (1981), *Industrial Policies in the European Community*, London: Macmillan

Davies, P. (2012) "The state of evidence-based policy evaluation and its role in policy formation", *National Institute Economic Review No. 219*, pp. R41-R52, January 2012.

Dinlersoz, E. and G. MacDonald (2009), "The industry life-cycle and the size distribution of firms", *Review of Economic Dynamics* 12: pp. 648-667.

DTI (1995) *Competitiveness - Forging Ahead*, Cmnd.2867, London: HMSO.

DTI (1998), *Our Competitive Future: Building the Knowledge Driven Economy*, Cmnd. 4176, London: HMSO.

Dutz, M.A. and S. Sharma (2012), "Green growth, technology and innovation", *Policy Research Working Paper No. 5932*, January, The World Bank, Washington, DC.

Dutz, M.A. and D. Pilat (2012), "Fostering Innovation for Green Growth: Learning from Policy Experimentation", Ch. 6 in *Making Innovation Policy Work*, OECD/World Bank, forthcoming.

Edler, J., L. Georghiou, K. Blind and E. Uyarra (2012), "Evaluating the demand side: New challenges for evaluation", *Research Evaluation 21*, pp. 22-47.

European Commission (2002), "Industrial Policy in an Enlarged Europe", COM(2002) 714.

European Commission (2010), "An Integrated Industrial Policy for the Globalisation Era: Putting Competitiveness and Sustainability at Centre Stage", COM(2010) 614.

Evans, P.B. (1995), *Embedded Autonomy: States and Industrial Transformation*, Princeton: Princeton University Press.

Fabiani, S., G. Pellegrini, E. Romagnano, and L.F. Signorini (2000), "Efficiency and Localisation: the Case of Italian Districts", in M. Bagella and L. Becchetti (eds.), *The Competitive Advantage of Industrial Districts: Theoretical and Empirical Analysis*, Heidelberg: Physica-Verlag.

Faeth, I. (2009), "Determinants of Foreign Direct Investment – A Tale of Nine Theoretical Models", *Journal of Economic Surveys*, Vol. 23, pp. 165-196.

Foray, D., P.A. David and B.H. Hall (2009), "Smart Specialisation – The Concept", http://ec.europa.eu/invest-in-research/pdf/download_en/kfg_policy_brief_no9.pdf?11111

Foreman-Peck, J., and G. Frederico (1999), *European Industrial Policy: The Twentieth-Century Experience*, Oxford: Oxford University Press.

Geroski, P.A. (1989), 'European Industrial Policy and Industrial Policy in Europe', *Oxford Review of Economic Policy*, Vol. 5, 1989.

Glaeser, E.L. (2001), "The Economics of Location-Based Tax Incentives", *Harvard Institute of Economic Research Discussion Paper No. 1932*, November 2001.

Glennerster, R. (2012), "The Power of Evidence: Improving the Effectiveness of Government by Investing in More Rigorous Evaluation", *National Institute Economic Review No. 219*, pp. R4-R14, January 2012.

Gort, M. and S. Klepper (1982), "Time paths in the diffusion of product innovations", *The Economic Journal* 92(367): pp. 630-653.

Graham, H. (1986), *European Industrial Policy*, London: Croom Helm.

Greenstone, M. and E. Moretti (2003), "Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare?" *NBER Working Paper No. 9844*.

Grossman, G.M. and E. Helpman (1994), "Protection for Sale", *American Economic Review*, American Economic Association, vol. 84(4), pp. 833-50, September.

Haque, I. ul (2007), "Rethinking Industrial Policy", *UNCTAD Discussion Paper No. 183*, United Nations Conference on Trade and Development.

Harding, T. and B.S. Javorcik (2007), "Developing Economies and International Investors: Do Investment Promotion Agencies Bring Them Together?" *CEPR Discussion Paper No. 6418*, London.

Harrison, A.E., and A. Rodriguez-Clare (2010), "From hard to soft industrial policies in developing countries", VoxEU.org 27 Jun 2010 http://www.voxeu.org/article/hard-soft-industrial-policies-developing-countries (accessed 31 Aug 2012).

Hausmann, R., and D. Rodrik (2003). "Economic Development as Self-Discovery", *Journal of Development Economics*, 72 (2): 603-33.

Johnson, C. (1984), "The Idea of Industrial Policy", in C. Johnson (ed.), *The Industrial Policy Debate*, San Francisco: Institute for Contemporary Studies.

Krugman, P. and M. Obstfeld (1991), *International Economics: Theory and Policy*. New York: Addison-Wesley.

Krugman, P. and M. Obstfeld (2009), *International Economics: Theory and Policy*, Seventh Edition. New York: Pearson-Addison Wesley.

Kuznetsov, Y. and C. Sabel (2011), "New Open Economy Industrial Policy: Making Choices without Picking Winners", World Bank PREMNotes, *Economic Policy No. 161*, September 2011.

Lall, S. (1987), *Learning to Industrialize*, London: Macmillan.

Lavis, J. N., D. Robertson, J.M. Woodside, C.B. McLeod, and J. Abelson (2003), "How can research organizations more effectively transfer research knowledge to decision makers?" *Milbank Quarterly*, 81(2), pp. 221-248.

Lechevalier, S., Y. Ikeda and J. Nishimura (2010), "The effect of participation in government consortia on the R&D productivity of firms: a case study of robot technology in Japan", *Economics of Innovation and New Technology*, Vol. 19, No. 8, November 2010, pp. 669-692.

Lerner, J. (1999), "The government as venture capitalist: the long-run impact of the SBIR program". *Journal of Business*, 72.

Lerner, J. (2009), *The Boulevard of Broken Dreams*, Princeton: Princeton University Press.

Lin, J. and Chang, H-J. (2009), "Should Industrial Policy in Developing Countries Conform to Comparative Advantage or Defy it? A Debate Between Justin Lin and Ha-Joon Chang", *Development Policy Review*, 27(5), pp. 483-502.

Livesey, F. (2012), "Rationales for industrial policy based on industry maturity", *Journal of Industry Competition and Trade* (2012) 12:349–363.

METI (2010), "The Industrial Structure Vision 2010 (outline)", Japanese Ministry for Economy, Trade and Industry. http://www.meti.go.jp/english/policy/economy/pdf/Vision_Outline.pdf (accessed 12 March 2012).

Ministry of Economic Affairs, Agriculture and Innovation (2011), "To the Top: Towards a New Enterprise Policy", 4 February 2011. Available at: http://english.minlnv.nl/txmpub/files/?p_file_id=2200574/

Ministry of Knowledge Economy (2011), "Industry Policies", available at www.mke.go.kr

National Economic Council, Council of Economic Advisers and Office of Science and Technology Policy (2011), *A Strategy for American Innovation: Securing Our Economic Growth and Prosperity*, Washington DC: The White House.

Naudé, W. (2010a), "Industrial Policy: Old and New Issues", *Working Paper No. 2010/106*, United Nations University, World Institute for Development Economics Research, September 2010.

Naudé, W. (2010b), "New Challenges for Industrial Policy", *Working Paper No. 2010/107*, United Nations University, World Institute for Development Economics Research, September 2010.

Nelson, R. R. and S. G. Winter (1982), *An Evolutionary Theory of Economic Change*, Cambridge: Harvard University Press.

Noland, M. and H. Pack (2003), *Industrial Policy in an Era of Globalization: Lessons from Asia*, Washington DC: Peterson Institute for International Economics. http://bookstore.piie.com/bookstore/358.html

Noland, M. and H. Pack (2005), "The East Asian Industrial Policy Experience: Implications for the Middle East", *Peterson Institute for International Economics Working Paper No. 05-14*.

OECD (1975), *Objectives and Instruments of Industrial Policy: A Comparative Study*, Paris: OECD.

OECD (2011), *Towards Green Growth*, OECD Green Growth Studies, OECD Publishing. doi: *10.1787/9789264111318-en*

OECD (2012), "Report by the Public Governance Committee on the Implementation of the Recommendation of the Council on Enhancing Integrity in Public Procurement", mimeo.

Owen, G. (2012), "Industrial policy in Europe since the Second World War: what has been learnt?" *ECIPE Occasional Paper No. 1/2012*. The European Centre for International Political Economy, Brussels.

Pack, H. and K. Saggi (2006), "Is There a Case for Industrial Policy? A Critical Survey", *The World Bank Research Observer* 21(2), Fall: 267-297.

Peres, W., and A. Primi (2009). "Theory and Practice of Industrial Policy: Evidence from the Latin American Experience", *CEPAL Serie Desarrollo Productivo No.187*.

Pilat, D, A. Cimper, K. Olsen and C. Webb (2006), “The Changing Nature of Manufacturing in OECD Economies”, *STI Working Paper 2006/9*, OECD, Paris.

Pisano, G.P., and W.C. Shih (2009), "Restoring American Competitiveness", *Harvard Business Review* 87, Nos. 7-8 (July-August 2009).

Pisano, G.P., and W.C. Shih (2012), *Producing Prosperity: Why America Needs a Manufacturing Renaissance*, Cambridge: Harvard Business Press Books.

Pitelis, C.N. (2006), "Industrial Policy: Perspectives, Experience, Issues," in P. Bianchi and S. Labory, (eds.), *International Handbook on Industrial Policy*. Cheltenham: Edward Elgar.

Pryce, V. (2012), “Britain Needs a Fourth Generation Industrial Policy”, Centre Forum, June 2012.

Rattner, S. (2010), *Overhaul: An Insider's Account of the Obama Administration's Emergency Rescue of the Auto Industry*, New York: Houghton, Mifflin Harcourt.

Riess, A. and T. Välilä (2006), “Industrial policy: a tale of innovators, champions, and B52s”, *EIB Papers*, Volume 11, No. 1/2006.

RIETI (2011), “Basic Research for a New Industrial Policy August 22, 2011 - July 31, 2013”, Research Institute of Economy, Trade and Industry, IAA, Tokyo. http://www.rieti.go.jp/en/projects/program/pg-06/index.html# (Accessed 9 March 2012)

Rodrik, D. (2004), “Industrial Policy for the Twenty-First Century”, *KSG Working Paper No. RWP04-047*, Cambridge MA: Harvard University.

Rodrik, D. (2008), “Normalizing Industrial Policy”, *Commission on Growth and Development Working Paper No. 3*, Washington DC.

Sharp, M. (1998), “What is industrial policy and why is it necessary?” paper prepared for TSER project on Science, Technology and Broad Industrial Policy, May 1998.

Sharp, M. (2001), “Industrial Policy and European Integration: lessons from experience in Western Europe over the last 25 years”, *Centre for the Study of Economic and Social Change in Europe Working Paper No. 30*, University College, London.

Swann, G.M.P. (2010), “The economic rationale for a national design policy”, Department for Business, Innovation and Skills, *Occasional Paper No. 2*, August 2010.

The Economist (2010), “Picking winners, saving losers: Industrial policy is back in fashion. Have governments learned from past failures?” 5 August 2010. http://www.economist.com/node/16741043

Tyson, L. and J. Zysman, eds. (1983), *American Industry in International Competition: Government Policies and Corporate Strategies*, Ithaca: Cornell University Press.

Wachter, M. L. and S.M. Wachter (1981), "Introduction", in M.L. Wachter and S.M. Wachter (eds.), *Toward a New Industrial Policy?* Philadelphia: University of Pennsylvania Press.

Wallsten, S. (2000), "The effects of government-industry R&D programmes on private R&D: the case of the Small Business Innovation Research Program". *Rand Journal of Economics*, Vol. 31, No. 1 (Spring 2000).

Weiss, J. (2011), "Industrial Policy in the Twenty-First Century: Challenges for the Future", *Working Paper No. 2011/55*, United Nations University, World Institute for Development Economics Research, September 2011.

White, L. J. (2008), "Antitrust Policy and Industrial Policy: A View from the US". Paper presented at the Second Lisbon Conference on Competition Law and Economics, Lisbon, Portugal, November 15-16, 2007. Revised January 2008

World Bank (1993), *The East Asian Miracle*, Washington DC: The World Bank.

Yusuf, S. (2012), "East Asian Experience with Industrial Policy and Its Implications for South Africa: Towards An Urban-Industrial Growth Strategy", Washington DC: The World Bank.

NOTES

1 See Foray, David and Hall (2009).

2 The 'smile curve' however may be very industry-specific. In some sectors, the fabrication stage remains an important source of value added – for example, Rolls Royce still manufactures in the United Kingdom and other developed country locations and captures value through a combination of manufacturing and upstream/downstream services. In other cases, the production stage is itself quite widely distributed in complex global value chains. There is a need for more research on the extent to which co-location of stages in the value chain is important for value capture and how this varies from sector to sector.

3 For example, according to Wikipedia: "The Industrial Policy plan of a country..... is its official strategic effort to encourage the development and growth of the manufacturing sector of the economy".

4 Thus, the European Commission (2010) launched a "fresh approach" to industrial policy, complementing horizontal framework policies with sector-specific initiatives, in particular in the fields of space technology, low carbon technology, sustainable mobility, pharmaceuticals and healthcare, as well as value chain participation in chemicals, the agro-food industry, textiles and cultural and creative industries.

5 As quoted by White (2008).

6 Livesey (2012) interprets the Pack and Saggi definition in this very narrow sense.

7 See Baldwin and Evenett (2012) for a discussion of trade in tasks, the implications for traditional comparative advantage and how tasks or stages in the value chain might be used as the basis for an industrial policy

8 There is, however, some evidence that direct subsidies might be more appropriate than trade barriers (Naudé, 2010a)

9 For example, Audretsch and Stephan (1996) showed that demonstrations of entrepreneurial success were important in creating clusters of scientists in biotechnology firms.

10 Although their concept is somewhat different, Peres and Primi (2009) use the term the "SES Synthesis" to refer to an approach that synthesises Schumpeterian, evolutionist and structuralist views —which they contrast with a "neo-liberal" position.

11 An example of this situation is described in the analytical work for the OECD Green Growth Strategy (OECD, 2011)

12 Hausmann and Rodrik (2003) introduced the term 'self discovery', the idea that entrepreneurship in a developing country consists of discovering the underlying cost structure – what can and cannot be produced profitably. There are parallels to be drawn with an iterative and collaborative process of seeking new areas of competitive advantage in more developed economies.

13 In practice, the distinction between horizontal and selective policies is not always clear-cut – see the discussion below on 'policy orientation'.

14 To some extent, the debate is about semantics since Lin accepts that comparative advantage can evolve and Chang would not propose that countries should adopt policies clearly at odds with comparative advantage. As Naudé (2010a) puts it, it is about the extent to which comparative advantage is defied. We use the more neutral term "comparative advantage-developing" in Figure 4. The axes in Figure 4 could equally well be labelled as 'latent comparative advantage and 'open comparative advantage'.

15 The approach is developed for industries or sectors, but it could be adapted to other groupings of firms, or to technologies or tasks, though the analysis would be more complex and less intuitive.

16 Examples include a series of competitiveness initiatives in the United Kingdom (e.g. DTI, 1995 and 1998), annual reports prepared by the National Competitiveness Council in Ireland, the EU Lisbon Programme and the associated National Reform Programmes adopted by each EU member state.

17 Including France, United States, Japan, Korea, Canada, Estonia, Netherlands, Portugal, Spain, United Kingdom, Norway, Israel and China – see OECD (2012) for details.

18 For instance in the Dutch "Top Sectors" approach to industrial policy, each targeted sector has a 'top team' consisting of an entrepreneur, scientist, civil servant and a standard bearer for the sector.

19 The distinction between instrumental and conceptual use of evidence is emphasised by Davies (2012), based on the discussion in Lavis *et al* (2003).

20 For example, Lechevalier *et al* (2010) in a study of the Japanese service robot industry found that while grants for R&D collaboration had contributed to a technological success, the policy had failed to lead to the emergence of a new industry because insufficient attention had been paid to other aspects, notably the market dimension and the institutional setting.