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Theoretical arguments for industrialisation-driven growth and economic development

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Abstract

We review the theories of growth and economic development in which the industrial sector plays a role. We briefly discuss the theoretical arguments that have been put forward in each of them and summarise the explanation of how industrialisation promotes growth and economic development. We follow an (occasionally overlapping) chronological order and find it convenient to distinguish three main periods in development thinking: the theories of the stages of economic development; the classical theories of economic development; and the modern views. The paper shows that, with few exceptions, industrialisation has always been considered the driver of economic growth in economic theory. However, in much of the relevant literature, the superiority of industry is assumed or observed, rather than explained, suggesting that there are a number of unresolved issues behind the different theoretical arguments for industrialisation-led economic development. Any development policy that focuses on industrialisation should consider these arguments in relation to specific objectives and contexts, rather than taking them for granted.

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1 Introduction

At the beginning of the XXI century, the role of Sub-Saharan African countries (SSA) in world trade is that of suppliers of primary commodities used for production taking place elsewhere (Abdon and Felipe, 2011; Hidalgo and Hausmann, 2009): metals and materials for manufacturing; land used for bio-fuel production; agricultural products such as coffee, bananas and flowers, to name but a few, used in agro-industries.

This raises a number of questions. Is it possible for a country to enter a pattern of sustained growth based on the production and export of primary resources? More to the point, can a country experience long-run growth without developing a vibrant and growing manufacturing sector? If the answer is no, why and how is industrialization key to sustained growth?

Growth and economic development theory have devoted much effort to understand the role of manufacturing and industrialization in income growth and economic development in the last six decades.

In this paper, we give an overview of the main answers to the above questions trying to understand why manufacturing is key to income growth. We review the different theories of growth and economic development in which the industrial sector, or more specifically manufacturing, plays a role, and we briefly discuss the theoretical arguments that have been put forward by these theories in support of industry-driven growth. In doing so, we follow an (occasionally overlapping) chronological order, finding it expedient to distinguish three main periods of development thinking: the theories of the stages of economic development; the classical theories of economic development; and the modern views, which include a variety of theories, among them the New Growth Theory (NGT), the evolutionary growth theories and the new structural economic models.

We briefly summarise the way in which each theory explains how industrialisation promotes growth and economic development. Where a reference to the manufacturing sector is only implicit, we describe how the theory uses this implicit assumption and the way in which it implies that industrialisation promotes growth.

The paper shows that, with few exceptions, industrialisation has always been considered the driver of economic growth in economic theory, even if in many case this is not at all made explicit.

For this review we need to cut through a highly heterogeneous literature with a heterogeneous terminology. In this respect, two related aspects are crucial: the definition of industrialisation and the relation between income growth and economic development.

First, the industrial sector usually includes manufacturing, mining and construction. For the sake of clarity, given the implicit focus of most of the literature on the primary, secondary and tertiary sectors, we restrict ourselves to industrialisation referred to manufacturing. In turn, a common definition of manufacturing is any physical or chemical transformation of materials, substances or components into new products, where materials, substances or components are products of agriculture, forestry, fishing, and mining, or other manufacturing output. Substantial alteration, renovation or reconstruction of goods is generally considered to be manufacturing (UNIDO and UNCTAD, 2011).

Second, in contrast with economic development, where the focus is on change, growth is often seen as the "idealization of economic dynamics in which things simply get bigger or smaller or stay the same size". (Dosi et al., 1994, p. 1) (citing Nelson (1994)). Here we privilege those

theories that consider growth as change and not only as expansion (Wood, 1994), but we do not exclude growth theories that, although they do not refer to structural change, have an implicit say on manufacturing.

In this paper, we will abstract from the difference between economic development and income growth and mainly stick to the terminology used in the theories under review.

Third and last, the evolution of theories was driven by, among other things, the issues perceived as the most crucial in a given period by the scientific elite, the general advance in knowledge, as well as the passing trends. Therefore, there is limited scope for the generalisability of any of the reviewed theories across time and space. Nonetheless, here we need to abstract from context specificity. This is not to say that it is irrelevant. Accordingly, we conclude this paper with a caveat that any serious consideration of the role of industrialisation should take into account at least the objective (e.g. GDP growth, income distribution or cultural freedom) and the specific setting (e.g. geographical, historical and cultural) in which it takes place. Even when we look at apparently homogeneous countries such as continental Europe, we observe immense differences in the process of industrialisation through the three main waves. This is equally true for any particular region of SSA – even more so in view of the mainly exogenous way in which geographic boundaries were designed. It follows that one should always keep in mind the distinction between the predictions and mechanisms described in theoretical models as well as the experiences of real world people.

Before proceeding further we must apologies for the injustice made to many theories. We could not include all of them in one single paper, and those included must be highly stylised, leaving out aspects that might be crucial to the theory/model, but not to this paper.

The paper proceeds as follows. In the next section, we provide a brief summary of the main theoretical reasons for the relevance of manufacturing in income growth and economic development (Section 2). In Section 3, we discuss the theories that interpret economic development as a sequence of development stages. In Section 4, we present the classical theories of economic development and the discussions on the role of the economic structure in income growth and economic development. In Section 5, we address a number of different theories that, since the 1980s, have employed different concepts of economic development, income growth and analytical frameworks. We pick some of the main contributions from each literature to highlight their main stance with respect to the role of industrialisation. Section 6 concludes with some final remarks.

2 Why is manufacturing important?

It is a historical regularity that sustained economic growth and modernization is associated with industrialisation, i.e. higher growth in production, value added and employment in the manufacturing relative to other sectors (Maddison, 2001, 2007; Szirmai, 2012).

This strategic role of manufacturing in modern economic growth is usually ascribed to a variety of sector-specific characteristics such as 1) increasing returns, technology and spillover effects; 2) high capital intensity ; 3) forward and backward linkages; 4) demand consideration; 5) employment potential (UNIDO and UNCTAD, 2011).

Increasing returns, technology and spillover effects. It is now commonly recognised that manufacturing is less likely to experience decreasing returns to scale than land-based activities, which are subject to the fixed supply of land of different qualities (e.g. Collier and Venables, 2007). Moreover, several authors have argued that manufacturing is the main source of innovation and technological change in modern economies (e.g. Lall, 2005; Gault and Zhang, 2010), for example as an outcome of research and development activities undertaken by manufacturing firms, especially in industrialised countries (Shen et al., 2007). In turn, innovation and technological change have been shown to be crucial ingredients of economic growth and transformation; see, for example, the evidence collected on the industrial revolution in England (e.g. Mokyr, 2010; von Tunzelmann, 1995). The manufacturing sector also contributes to the diffusion of new technologies to other sectors of the economy (Cornwall, 1977) in the form of embodied knowledge.

Capital intensity. Manufacturing is usually[1] assumed to be more capital intensive than agriculture and services, one reason being that capital can be accumulated more easily in spatially concentrated manufacturing than, for instance, in spatially dispersed agriculture. Another reason is that manufacturing is more prone to escape decreasing returns to investment. It follows that an increasing share of manufacturing determines an increase in capital accumulation.

Backward and forward linkages. Manufacturing is also assumed to be characterised by strong backward and forward linkages with other sectors, which are an important source of their demand: manufacturing firms are larger consumers of services (such as banking, transportation and insurance) and raw materials (such as energy and agriculture) than the other way around. Moreover, backward and forward linkages are also assumed to be more dense within manufacturing than within other sectors. As a consequence, an investment in manufacturing is likely to generate demand for investment in a related (sub)sector rather than in agriculture or services. It follows that manufacturing can also be a major source for employment and output growth.

Demand (Engel's Law and elasticity of demand). Engel's law states that the share of basic products, e.g. food and shelter, in household expenditure falls with an increase in per capita income. It follows that as world income increases, countries specialising in basic goods will profit less from expanding world markets than countries exporting manufactured goods. In fact, recent research shows that what matters in terms of growth is not only how much is exported but also what is exported (Hausmann et al., 2007). The countries that in the last three decades have benefited most from world income growth are those that have specialised in products for which the demand has increased with income, such as high-tech manufacturing goods, i.e. goods with a high-income elasticity of demand.

Employment potential. Manufacturing is usually believed to have a higher potential for employment creation relative to agriculture and traditional services.The higher employment multiplier of manufacturing vis-à-vis agriculture depends on the above-mentioned difference in returns to scale, which limits the opportunities for employment growth in agriculture. In fact, in manufacturing output expansion can take place without a reduction in workers' productivity.[2] It has

[1] Capital intensity is a feature of the overall industrial sector: manufacturing can also be labour intensive, particularly in the initial stages of development. The capital-intensive nature of the manufacturing sector is an empirical issue: sectors characterised by lower capital intensity like light-manufacturing may results more growth inducing than heavy-manufacturing capital intensive sectors.

[2] Empirical evidence on the employment elasticity of manufacturing seems to support this argument (Szirmai, 2012). Note, however, that the problem may well be the opposite, with increases in labour productivity due to technological

been noted that the importance of services in terms of employment shares has been increasing in the last decades, particularly in high-income industrialised countries Rowthorn and Ramaswamy (1997). However, the quality of employment in the service sector is very heterogeneous: some activities show high levels of productivity, while others entail levels of productivity and income much lower than in manufacturing. Moreover, it seems that high-productivity services are related to the production of services for the manufacturing sector (e.g. Ciarli et al., 2012). Therefore, the importance of manufacturing goes beyond its direct effect in creating direct employment.

The potential for the increasing division of labour is one the reasons why manufacturing was considered by Adam Smith as the engine of economic growth. In fact since the beginning of the economic theory economists attributed to the manufacturing sectors some peculiar features, namely the fact that the division of labour was more likely in those activities rather than in agriculture.

The above-mentioned factors have been used, in a variety of combinations in economic models, to justify the mechanisms behind the industrialisation-led theories of growth and economic development and to support the view of industrialisation as a necessary stage of economic development and an objective *per-se*. The question whether manufacturing continues to be the engine of growth that it has been since the industrial revolution – with large differences in the process and results in different parts of the world – needs to be resolved empirically.[3]

In the next section, we outline some of the theories that originated at the outset of the Second World War and share the notion that development is a process characterised by linear stages which all countries have to pass through before achieving modern industrialisation. We present two of the most influential views.

3 Stages of economic development

The idea that manufacturing (and industrialization in general) is the key to economic development has a long history. For instance, economic historians largely agree on the importance of the industrial revolution and the manufacturing growth as one of the key elements that made England the economic world power of the XIX century. The evidence on the industrial revolutions has translated into the view of economic development as a linear process comprised of well-defined consecutive stages.[4] For instance, Marx identifies four different stages in his analysis of growth (von Tunzelmann, 1995): 1) pure labour economy producing subsistence goods; 2) early capitalism based on handicraft technologies; 3) emergence of manufacture based on merchants and initial accumulation of capital; 4) modern industry ("machinofacture") based on the capitalist mode of production. Probably the most influential proponent of the stages-of-growth model of development is the American historian Walt W. Rostow[5]. In The Stages of Economic Growth, Rostow (1960) uses evidence from Kuznets to propose the occurrence of economic development in five stages: 1) traditional society; 2) preconditions for take-off; 3) take-off; 4) drive to maturity; 5) the

change in manufacturing that reduce the demand for workers, as is usually the case with skill-biased technical change.

[3] See the next chapter in this book.

[4] This tradition goes back to Smith (1961) and Mill (1848).

[5] Interestingly, Rostow (1960) develops his analysis as an antithesis to Marx's analysis of the stages. Indeed, the subtitle of Rostow's book is 'A Non-Communist Manifesto'.

age of mass consumption. He suggests that as they develop, all countries necessarily pass through these five stages. Countries in the stage of a traditional society or in a condition prior to take-off only need to fulfil three preconditions: 1) the rise of investment to 10% (!) of national income; 2) the advance of one or more 'leading' manufacturing sectors[6]; 3) the existence or emergence of a political, social and institutional framework able to support the growth of the modern sector, i.e. favouring the mobilisation of capital from domestic resources. Investment and the increase in capital supply are key to these preconditions and in Rostow's view can be achieved by mobilizing domestic and foreign savings.[7] Once the leading sectors are established, they will implement (pull) the subsequent developments through backward and forward linkages (intermediate demand). Interestingly, Rostow differentiates between social overhead capital, namely infrastructures, and capital used in production. For instance, roads and railroads differ from factory machinery in that the payback period is much longer and that it is society as a whole, and not an individual investor, that enjoys the returns to investment. In other words, investment in infrastructures has large positive externalities, therefore requiring an involvement of the government. Rostow also suggests that one important characteristic of successful industrialization is the simultaneous development of a number of sectors. For example, England experienced take-off because banking, trade, shipping and manufacturing all made progress and because this was backed by military power to defend the country's interests. In sum, the main characteristics of a take-off are an increased effective demand for the output of new sectors capable of a rapid expansion of capacity; new methods of production; availability of financial capital to support the process and a high rate of reinvestment of profits; and the growth of leading sectors that induce increased demand for the products of other sectors in the domestic economy.

While Rostow's view was highly influential, it also drew several criticisms. In attempting to offer a general model of economic growth, Rostow discussed many non-typical cases, making it difficult to conclude that there was in fact a typical case. His theory points us towards issues of investment and capital and the idea that industrialisation will automatically follow if investment is channelled towards/ to the 'right' sectors.

With few exceptions[8], this view of economic development through stages of growth was in full accordance with the predominant view among economists of a mechanical positive effect of industrialisation on growth. For instance, Kaldor (1966) established four stages of economic growth, which characterise any country's industrial development. As in Rostow (1960), the transition from one stage to the next is deterministic.[9] In the first stage, the emergence of a domestic consumer goods industry reduces the dependence on imported goods; the equipment to manufacture these goods are either produced domestically or imported. Subsequently, industrialisation must enter the second stage, in which the domestic production of consumer goods provides the basis for positive net exports, sustaining demand and division of labour through export. In the third stage

[6]Which historically differed across countries.

[7]Note that this is clearly a different view with respect to the Keynesian one in term of relation between savings and investments

[8]For instance, Gerschenkron questioned Rostow's proposition that all developing countries go through a similar series of levels and stages and its implication that it is possible to generalise the growth trajectory of different countries.

[9] Note that Kaldor did not imply that the transition was smooth or that it occurred in the same way in the different countries . His analysis (Kaldor, 1966) is indeed based on the observation that the process of vertical specialisation, as suggested by Young, did not occur evenly and that it was not always based on the same source of demand (Argyrous, 1996).

(which may occur simultaneously with the second), domestic production substitutes also for the import of capital goods. In the fourth stage, a country becomes an exporter of capital goods. In this stage, a fast external demand growth for capital goods is coupled with the domestic demand growth supported by the expansion of the capital goods sector (Kaldor, 1966). The main features of the Kaldorian four-stage model are the identified sources for the expansion of demand and its autocatalytic character that works through the division of labour and the demand for capital goods. There are three crucial assumptions: the initial exogenous demand growth, the higher learning associated with manufacturing and an increase in productivity in the capital sector.

In sum, the stages of economic growth imply a process of industrialisation. One element common to all these stages is the importance investment has in all the different types of capital required to sustain industries, i.e. infrastructures, consumer goods and capital goods, and the growth of manufacturing, substituting for imported goods. To be sure, implicit in the stages is a process of modernisation that leads to wealth increase. In Rostow, this is mainly related to the goods produced and consumed and to socio-political status. In Kaldor (as will be seen more clearly in the next section), it is the productivity of different technologies that constitutes the implicit leverage in the progress by successive stages.

We now turn to the main classical theories of growth and economic development that have been strongly influenced by the idea of stages and have, in turn, greatly influenced modern views the modern view of economic development, as will become clear in section 5.

4 Classical theories of growth and economic development

Immediately after the Second World War, research on the causes of growth gained a much attention. We distinguish three main strands: balanced and unbalanced growth, Keynesian and neoclassical growth models and theories of international trade and growth.

4.1 Balanced and unbalanced growth and development theories

We begin discussing a set of theories, involving very different strategies of development as a result of the investment in modern manufacturing sectors. At one extreme, there is the theory of the 'big push' and balanced industrialisation (e.g. Rosenstein-Rodan, 1943).[10] At the other extreme,[11] there is the theory of unbalanced industrialisation (e.g. Hirschman, 1958).[12]

The idea that development consists mainly in a process of structural change led by the expansion of the manufacturing sector was first exposed theoretically in Rosenstein-Rodan's work. He (1943) suggests that the virtuous cycle of development depends essentially on the relations between the firm's economies of scale and the size of the market.[13] In an economy with a traditional and a modern sector, the latter has the potential to be more productive and pays higher wages. However, for the productivity advantage of the modern sector to be large enough to pay higher

[10] Nurkse (1961) shares with Rosenstein-Rodan several theoretical elements.

[11] These authors are conveniently regarded as being opposed to one another, although in practice they agreed on a large number of points Alacevich (2007), particularly with reference to the need for industrialisation programmes.

[12] Another important contributor to this approach is Fleming (1955).

[13] See Murphy et al. (1989) for a later reappraisal of the Rosenstein-Rodan theory in the economic growth modelling literature.

wages, the sector requires a minimum scale and, hence, a sufficiently large market. It follows that the modern sector requires a market of workers who earn a wage high enough to cover the higher prices of the modern sectors goods: these are the workers in the modern sector. Therefore, unless a sufficiently large modern sector is already in place, the economy is stuck in a trap in which nobody has an incentive to invest in the modern sector if there is no demand, and demand is not created because nobody invests. The solution of the Rosenstein-Rodan model is to kick off modernisation by providing the resources to invest on a sufficiently large scale, after which the economy becomes self-sustaining. In essence, Rosenstein-Rodan calls for a 'Big Push' industrialization, coordinated by the state to overcome the coordination failures in exploiting network effects of industrial linkages that characterize the decentralized market and lead to underdevelopment traps. Hirschman (1958) also analyses the relation between manufacturing sectors as a key to growth and economic development but takes an opposite position with respect to the 'Big Push'. Starting from the same interaction between economies of scale in manufacturing sectors and the size of the market, Hirschman argues that the opportunities for growth are endogenous to a developing economy: one needs to find the sectors that have a comparative advantage, where there are opportunities for investment. Backward linkages with providers of intermediate inputs, and forward linkages with buyers of intermediate inputs can generate a self-reinforcing growth (increasing returns to investment at the aggregate level). In Hirschman s definition, a backward linkage exists when a sector's demand enables an upstream sector to be established at least at the minimum efficient scale. This means the demand of a strategic sector is large enough for an investment in at least one upstream sector to be profitable. Similarly, a forward linkage exists when the increase in productivity due to sector growth is sufficient to reduce the cost of its output so that, for producers in a downstream sector, it is profitable to use it as an input and to increase investment. It follows that a new upstream or downstream sector can generate the same dynamics, creating linkages with new sectors, and so on, following an unbalanced pattern of growth through different phases of investment and creation of imbalances. The imbalance is crucial here as it represents the period of excess demand (supply), which increases (reduces) the price (cost) of an intermediate good to make it profitable for a provider (buyer) to invest in its production. Moreover, the differences between sectors is strengthened by the fact that each sector has its own system of linkages, thus exerting push and pull forces on the rest of the economy with different intensity. In Hirschman, it is the manufacturing sector that is characterised by stronger backward and forward linkages with respect to agriculture and service.

Kaldor also privileges an unbalanced interpretation of the growth mechanism and, similarly to Rosenstein-Rodan and Hirschman, puts manufacturing (and particularly capital goods) at centre stage. As mentioned above, it is the interactions between (different sources of) demand and the division of labour that explain an autocatalytic process of cumulative causation in which growth breeds growth:[14] on the one hand, the increase in the demand for intermediate goods, on the other, the increase in productivity due to learning in specialised activities.[15] Therefore, the process kick-starts with an increase in exogenous demand, which is the precondition for a minimum scale that

[14] See also Myrdal (1968) and Argyrous (1996) for a discussion on its different uses.

[15] This idea is inspired by Young (1928) who argues that the development of mass production and the application of heavy machinery mean that processes which were once undertaken within the same craft shop became the bases for entirely separate industries.

induces specialisation. Second, learning by doing increases productivity. In the manufacturing sector, this mechanism is usually referred to as Kaldor's first law. When, through specialisation, the economy also produces capital goods, then technological advance (that increases their embedded productivity) percolates in the economy, having an effect on growth that is more than proportional. "It is the rate of growth of manufacturing production (together with the ancillary activities of public utilities and construction) which is likely to exert a dominating influence on the overall rate of economic growth: partly on account of its influence on the rate of growth of productivity in the individual sector itself, and partly also because it will tend, indirectly, to raise the rate of productivity growth in other sectors. And of course it is more generally true that industrialisation accelerates the rate of technological change throughout the economy" (Kaldor, 1966, p. 112). This diffuse increase in productivity reduces output prices which is likely to lead to an increase in demand (also on foreign markets where domestic production is more competitive due to an increase in productivity), production, and again learning, via the second Kaldor Law, namely the Kaldor-Verdoorn Law: the 'positive causal relationship between the growth of manufacturing output and the growth of labour productivity in manufacturing'. footnoteIt should be noted that Kaldor's interpretation of Verdoorn's Law (causal positive relation between manufacturing output and manufacturing productivity growth) is related to his perception that economic growth is demand determined rather than resource constrained. The alternative interpretation of the positive relationship between output growth and productivity growth would be to consider manufacturing output growth as a consequence of manufacturing productivity growth, where the latter could take place once constraints on the supply side are removed. In other words, the constraint would be on the supply side and not on the demand side. It is this self-reinforcing mechanism that leads to the cumulative causation of a virtuous growth cycle. In summary, it can be said that once an economy gains a growth advantage, it will tend to maintain it through increasing returns of the most advanced manufacturing (capital) activities and the competitive gains induced by demand growth. It is important to emphasise that in Kaldor's view, the growth of manufacturing is determined by the growth of effective demand which has both an exogenous and an endogenous component (triggered by the Kaldor-Verdoorn Law), while both productivity growth and employment growth are endogenous. Two factors are the main sources of effective demand: the rural sector in the early stages of development and export in its later stages (Kaldor, 1966, 1975)).

The two leitmotivs of the discussion on balanced vs. unbalanced growth and economic development are the centrality of industrialization (manufacturing sectors) and the presence of non-linearities requiring some form of intervention to avoid the trap of non-development. In the case of balanced growth, the scope for intervention is clear: due to the low level of demand for 'modern' goods, there is no incentive for private investment in modern manufacturing sectors, and planned coordination is needed. In the case of unbalanced growth, what is needed is an identification of the sectors that have strong linkages, both backward and forward, and can be competitive in the short term. Once the manufacturing engine is set in motion, there will be small incentives to substitute locally produced capital goods for imported ones as this sector is the core of an economy's competitiveness. Therefore, although industrialisation is considered invariably to lead (more or less automatically) to growth, some kind of state intervention is needed to start this process. These theories have posed novel and complex issues for economic research. If investment and growth

are not automatic and depend on what a country produces, choices have to be made concerning both the specialisation pattern and the type of investments. Unfortunately, these issues were left unresolved for a long time because of because of the economic discipline's change of direction towards growth models that could not easily deal with the non-linearities and multiple equilibria underlying structural change (Krugman, 1994).

4.2 Growth theories

The first mathematical models of economic growth were developed by Harrod (1939) and Domar (1946) in a Keynesian framework. The Solow (1957) and Swan (1956) models instead initiated the tradition of Neoclassical growth theories. The common objective of all these models was to understand the mechanics of growth in order to identify its main determinants from both a theoretical and empirical point of view.

In the Harrod-Domar framework, growth is a function of capital accumulation only, characterized by constant returns to scale. In turn, capital accumulation is determined by a number of exogenous variables, such as population growth and saving rate. A central role is played by savings (that allow the increase in the amount of capital): a country with low saving rates (where consumers need to allocate all income to consumption) can kick off income growth with an exogenous increase in savings/capital. However, savings indicate the growth potentials, but are not sufficient for the realisation of growth. In Harrod-Domar savings need to be transformed into investments, which in a Keynesian fashion is function of animal spirits, the expected returns on investment. An initial condition of high savings and low investment, on the contrary, may induce low consumption , and therefore low investment and growth.

The Solow model (Solow, 1957) is the seminal contribution to the Neoclassical theory of growth. It expanded on Harrod-Domar, adding a second factor, labour, and introducing a third exogenous variable, technology, to the growth equation. Unlike the fixed-coefficient and the constant-returns-to-scale assumptions of the Harrod-Domar model, Solow's model exhibits diminishing returns to labour and capital and constant returns to both factors. Consequently, capital investment alone is then no longer sufficient for sustained growth. Instead, technological progress becomes the main factor explaining long-term growth. As for savings in Harrod-Domar, they are determined exogenously, that is, independently of all other factors. Investment per se is then no longer sufficient for growth, but acquisition of technology is. One important prediction of this model is the convergence to an income level given by technology, *ceteris paribus*: poorer economies with lower capital per worker (relative to their long-run or steady-state capital per worker) grow faster due to the decreasing returns to capital, *ceteris paribus*.

Notably the idea that growth needs structural change was absent in these early theories of economic growth. The reason is that formal models were usually one-sector growth models.[16] The mathematical formalisation of the basic mechanics of growth came at the cost of a reduction of the complexity of the economic structure to one single sector, implying no transformation. The attention to industrialisation and the role of manufacturing are thus implicitly lost in these initial theories of growth. However, in the Harrod-Domar model it is quite clear that it is capital accu-

[16] One exception is Uzawa (1961), but the objective there is to determine the steady-state solution in a two-sector version of the Solow model.

mulation that drives growth, and this is fully in line with the idea of investment in infrastructures and capital-intensive sectors. Indeed, the policy prescription of the 'Big Push' is very similar to that of the savings gap implicit in the Harrod-Domar model, as is witnessed by decades of World Bank policies (Easterly, 2002). The case of the Solow model is different, where convergence assures that capital investment has a more limited scope (though it is still required for convergence). Another difference between the two models is the need for policies. On the one hand, in the Solow model competitive markets (via wages and profit rates) will automatically provide the incentives required to invest whatever is needed for (conditional) convergence. On the other hand, in Harrod-Domar, as savings are exogenous, there is no automatic mechanism that insures that investment will occur: domestic investments must be complemented by foreign investments. In other words, for Solow, policy is irrelevant (beyond securing competitive markets), while for Harrod-Domar governments should induce the necessary capital investment (and hence policies are critical). The importance of public investment is underlined by the risks of an ever decreasing rate of investment.

4.3 International trade and growth

Since the dawn of economics, the relation between international trade and economic growth has been strongly disputed. One relevant aspect of the debate – which was particularly heated during the post-colonial period – considered in this section is the structure of trade: the question whether international trade benefits all economies or only those with a particular sectoral specialisation of production. Indeed, net export is a relevant source of demand, which may lead to growth. According to the standard theory of comparative advantage, a country always improves its (aggregate) welfare by increasing trade integration and specialising in the production of goods where the opportunity cost of production is relatively lower than in other countries. However, other theories have emphasised that exporting agricultural products and raw materials is not equal to exporting manufactured goods. For example, in stark contrast with the theory of comparative advantage, Prebish (1950) and Singer (1950) showed that in the 1960s the trade specialisation of developing countries had an adverse effect on their economic development. They observed that the relative terms of trade of primary products, which were exported mainly by countries in the periphery, with respect to manufacturing goods followed a negative trend (possibly secular). They explained this price divergence with the differences in market structure between the primary and the manufacturing sectors. For instance, the supply of agricultural products is rather inelastic with respect to manufacturing. A reduction in global demand is therefore reflected in a reduction in the supply of manufactured goods to clear the market, with some decrease in price, while agricultural production is usually does not adapt to demand and the only variable that might change, thereby clearing the market, is price. Similar observations can be made with respect to market power. The manufacturing sectors are often characterized by an oligopolistic market structure while the agricultural sector is usually assumed to be characterized by perfect competition. The different mechanism for price determination in the two sectors implies that prices for manufacturing products are expected to be more stable than those for agriculture products (see also Kalecki (1990)). The labor market also plays a role in the deterioration of the terms of trade: more organised unions in the centre allow workers to transform part of productivity growth into higher wages, rather than into lower prices. Inversely, informality and the elasticity of labor supply in developing economies

imply that workers do not have the bargaining power required to avoid that productivity gains are entirely transferred to prices. Moreover, these modes are closely related to production patterns and barriers to entry related to technology and learning. Interestingly, the appropriation by workers in the center of increases in productivity is viable solely in the case in which high barriers to entry prevent prices from falling. This implicitly assumes the existence of some sort of (Schumpeterian) dynamic comparative advantages that are recreated and which are not easily eroded by imitation.

Under the circumstance that for several developing countries export is largely represented by primary products, it follows that the pattern of specialisation negatively affects their growth.[17]

It follows that countries in an early stage of development should attempt to produce and export manufacturing goods with increasing terms of trade despite the comparative advantages.[18] The picture becomes even more interesting when the distinction between static and dynamic comparative advantages is introduced. Dynamic comparative advantages refer to the fact that factor costs evolve over time – also due to trade – and that some sectors may yield longer-term benefits which are overlooked when only present factor costs are considered (for a discussion, see Redding (1999)). Exporting a good with a higher value added, requiring an investment in skills even when the country has not a comparative advantage in producing it, will under certain circumstances benefit the economy in terms of an increase in skills, higher wages, higher domestic demand and a higher balance of trade. Traditional theories of trade are static in nature and thus do not consider differences among sectors since trade always brings in static efficiency gains. It will be shown in Section 5.2 how this may change in dynamic terms. [19] The bottom line is that what matters is not only how much but also what a country exports (Hausmann et al., 2007), due to terms of trade, the productivity growth of capital and manufacturing, learning and dynamic comparative advantages, market power, value added appropriation, and so forth. The basic idea is that sectors differ from the point of view of the potential for productivity growth and creation of externalities for the rest of the economy: in some sectors this potential is higher than in others because their sector-specific technological opportunities are higher (Dosi, 1988). In this context, specialisation according to existing comparative advantages may be welfare decreasing, while active trade policies may be welfare increasing (typically by favouring entry into high-tech sectors or protecting strategic sectors).

5 The modern views

The contributions to the theories of growth and development since the 1980s have taken a number of different directions.

[17] While the Prebisch-Singer (PS) hypothesis is very appealing, one should note that recent evidence casts some doubt on the secular negative trend of the terms of trade and on its deterministic nature (see Blattman et al. (2007)). However, even if the PS hypothesis is not verified and the secular trend is not negative, it could be argued that being specialized in primary commodities generates another dependence: primary commodity prices are more volatile than manufacturing goods prices. Yet, as a final counter-argument, there is evidence that if insurance and precautionary savings are possible, the volatility problem disappears. To summarize, theoretical arguments for industrialisation based on the PS hypothesis are now less strong than when this was formulated in the 1950s.

[18] Please note that those recommendations are hardly different from those discussed in relation to the stages of development in Section 3 or the balanced growth debate in Section 4.1.

[19] In particular, diversification may work as a welfare and growth enhancing insurance device in the context of uncertain environments (Di Maio, 2008; Di Maio and Valente, 2013).

Two common traits characterise the theorising change concerning growth and economic development: the microeconomic foundations in terms of the actors involved, the institutions in which they act and their inherent heterogeneity as well as the increased focus on the specifics, such as context, region, country, stage and even culture, as opposed to broad generalisations. Such trends become even more pronounced following the dissatisfaction with the Washington Consensus doctrine around the turn of the 21st century.

In this section, we will mainly focus on growth theories and the recent revisiting of the relation between trade and growth. Without any claim to doing justice to a huge and still growing body of literature, we only concentrate on one or two focal contributions to briefly summarise the main works of each theory relevant to this paper. In particular, we summarise the main theoretical arguments (or lack of) in support of industrialisation as a source of income growth (and economic development).

5.1 Growth theories

We distinguish three main waves of growth theorising in modern times. The first wave merges economic development and income growth under the same label of income growth, leaving on one side the analysis of change. For example Lucas (1988): "By the problem of economic development I mean simply the problem of accounting for the observed pattern, across countries and across time, in levels and rates of growth of per capita income. This may seem too narrow a definition, and perhaps it is, but thinking about income patterns will necessarily involve us in thinking about many other aspects of development of societies too, so I would suggest that we withhold judgement on the scope of this definition until we have a clearer idea of where it leads us." [p. 3]

A second wave emerged from a group of structuralist and evolutionary economists who focuses on the changes that accompany economic growth, particularly those in the structure of the economy, explicitly referring to the relations between sectors, industrial dynamics, changes in product composition, and the like. This group of theories usually assimilates economic development with those structural changes.

The third wave is comprised of a group of theories that focus, in different ways, on the changes in the institutions that govern economic activities. In their analysis, some of the theories merge various transformational aspects of growth and economic development, such as institutional changes, sectoral changes and the changing patterns of people skills and demand.

New growth theory

The lack of evidence on the convergence of the per capita income across countries with an initially different income, as predicted by the then prevailing theory of growth (Solow, 1957), has motivated the research on models that, building on Solow, could endogenously represent diverging economies (Lucas, 1988; Romer, 1986). This required the models to represent an element of endogenous growth that allowed an economy to escape the law of decreasing returns to capital (investment). In this way, economies can grow infinitely, and unconditional convergence need not occur, as empirically observed (e.g. Mankiw et al., 1992). The endogenous mechanisms also improve the understanding of growth, in particular by focusing on endogenous changes in the

technology of production (which, in turn, affects the productivity of inputs to production). For a comprehensive review of the large number of models we address the reader to Aghion and Howitt (1998)). Furthermore, in the previous models in which population and technology change were exogenous, there was no scope for any development policy (Romer, 1994), and industrialisation could play a role only through a non-sector specific capital accumulation (up to the point where marginal returns to capital are non-zero).

Within the NGT, we can distinguish four different basic mechanisms of endogenous growth: i) investment in one factor of production, capital, that cumulates at the aggregate (national) level; ii) the introduction of public goods, again in terms of investment at the economy level; iii) accumulation of a different type of capital, human capital; and iv) technological innovation as a systematic activity of Research and Development (R&D) (Amable and Guellec, 1992). The relevance of the manufacturing sector thus follows from the assumption that this is where the benefits of the endogenous change in technology occur, independently from their sources.

Romer (1986) explicitly refers to the learning process that occurs in production at the aggregate level. He uses Marshallian externalities to explain increasing returns of firm investment at the aggregate level, assuming some of this investment spills over to other firms. The basic assumption in Romer's model is that capital investment at the firm level increases the firm's production with the usual diminishing returns, but still increases the technological level of the country. Although Romer does not tie the analysis to any specific sector – as it true for all the NGT – reference to spillovers and Marshallian externalities are usually found with respect to the manufacturing sector, where most of the technological investment occurs.

Alternatively, Lucas (1988) introduces a different source of aggregate increasing returns via the investment in the human capital employed in firms. Although firms' production function still represents constant returns to capital, the productivity now also depends on the investment in human capital applied to production. As a consequence, it is not capital per se that increases income growth (à la Kaldor) but its use coupled with high skills. As in the previous case Lucas' model considers one representative sector. The relevance of industry for growth then depends on the relative relevance of human capital for industry's productivity with respect to other sectors.

Finally, a series of models have concentrated on the role of firms' R&D activities, thus internalising the gains of research instead of accounting for them as externalities cumulating at the aggregate level. These models provide a disaggregated view of the growth process in terms of both firms and sectors. The base version of these models considers two sectors: the intermediate good sector that produces differentiated intermediate goods using raw inputs and a final sector that produces goods for consumption using intermediate goods.

Models in this tradition differ in the way in which they represent the output of R&D. Some models focus on the variety (in term of their number) of goods (Romer, 1990), either in the final goods sector or in the intermediate sector, maintaining fixed the quality of the new goods (e.g., respectively Grossman and Helpman, 1989a,b). Because the inputs used by firms in the final goods market are subject to decreasing returns to scale, it is the increase in the number of inputs invented in the intermediate sector that sustains growth. Because these models are strictly supply driven (no role for demand of technology) it is the rate of innovation in this sector which is the crucial engine of growth. Other models focus on the quality of goods – with no change in their variety – in the

commodity market or in the capital sector (e.g. Aghion and Howitt, 1992; Grossman and Helpman, 1989c, respectively). In particular, Aghion and Howitt (1992) consider actual innovation in the production of new intermediate goods that offset the old ones, inducing a sequence of capital vintages. The higher productivity of the new capital vintages is thus what offsets the decreasing returns to capital, putting emphasis on the research activity of an intermediate sector. Because this innovation is characterised as a random event, the growth rate of the economy also follows a stochastic process. In these models, growth therefore depends on the incentives to innovate such as the demand by firms in the commodity market, an increase in monopoly power or an increase in innovation cost (or an increase in the productivity of innovation).

How do these models give grounds for manufacturing and industrialisation as the source of growth? The positive effects of industrialisation are realised when we observe either increasing returns due to externalities from investment, or employment of human capital that increases productivity, or active efforts to improve the quality of intermediate goods. Although there is no explicit mention in the above NGT models, de facto manufacturing is the sector where technological externalities from investment are likely to occur, where there is also a higher incentive to absorb high-skilled workers (with higher wages) and where R&D expenditure is a formal part of business activity. This view is reinforced by the fact that these models represent income growth as a supply-side question: the goods that most likely create their own demand are produced in the manufacturing sector. Thus, with reference to NGT, industrialisation is the main engine of growth only under the condition that manufacturing has the technological properties summarised above.

Structural change growth models

Since the beginning of the 1980s, a number of growth models have sought to analyse the relation between income growth and sectoral dynamics with the focus on the changes taking place at the microeconomic and sectoral levels. Differently from the Solow model and the two-sector NGT models, in these models the share of sectors in an economy – measured as employment or output – changes endogenously as an outcome of the competition among sectors, their technical relations and the composition of demand. Structural change models thus provide some insights into the effect of the sectoral composition on income growth, when such a composition changes over time (e.g. when an economy makes the transition from primary goods and commodities to producing manufacturing goods). Under the particular condition that all sectors follow the same dynamics, we are back to the Solow-NGT framework, and an analysis at the sectoral level would not add any new insights.

Pasinetti (1981) considers an economic system composed of different, vertically related sectors, each with an autonomous production process. Output is produced through capital goods and labour. Assuming that the sectors can be ordered along a vertical structure, the final sector constitutes the final demand, and simultaneously provides the labour input to all other sectors. An equilibrium is reached only when all sectors produce at full capacity and when there is full employment, which is not assumed at the outset. The contribution of each sector to aggregate production depends on its technical efficiency and on the demand for its output. Technical change is exogenous but heterogeneous across sectors. Each sector may also be characterised by a specific demand elasticity, which changes following the aggregation of individual Engel curves. These are

consumer specific and thus change with the change in income, as consumers learn about the new goods made available. As a result, changes in demand are uniform across sectors. These changes generate unbalances between sectors. Ultimately, the relation between techniques of production and changes in demand determines the long-term quantity and prices in the economy. In each specific time period, demand concentrates on specific sectors, depending on the dynamics of technology, on how gains from increased productivity are distributed, and on how this affects the demand pattern. Pasinetti assumes that consumers first satisfy their need for essential goods (high priority wants) and then move to the next good in the hierarchy of needs. Pasinetti distinguishes three main possible growth dynamics: population driven, technology driven and demand driven. In the latter dynamics, which is the most important here, changes in sector-specific technology and demand mean a reshuffle in employment across sectors, requiring changes in the use of inputs and investment, in turn implying changes in the sectoral composition of the economy. Without making any a priori assumption on how to map sectors of the model onto real sectors, it is the interplay between technical change and demand that is crucial in the model and the sequential way in which sectors contribute to the growth of the economy. In other words, new products and sectors need to emerge, following changes in demand induced by technical change, as the demand for one particular good is becoming exhausted and generates decreasing returns. The structure of Pasinetti's model provides important hints on the composition of an economic system and its influence on growth, which are explored in a number of models that followed his contribution.

In line with Pasinetti's approach, different models conceive of the sector as the unit of observation and relate the growth patterns of the economy to the sectoral restructuring and a country's trade specialisation (Cimoli, 1994; Los and Verspagen, 2003; Verspagen, 2002, 1993; Cimoli and Porcile, 2009; Cimoli et al., 2010). These models bridge the structuralist (discussed in section 4.3) and the evolutionary tradition (discussed below) in a number of different ways. Without doing full justice to the rich diversity of contributions, it can be said that these models are an attempt to merge an explicit account of technological change in the evolutionary Schumpeterian tradition (Nelson and Winter, 1982) with the main features of the structuralist approach.[20] The main general result of these models is that a country that specialises in sectors with a low elasticity of demand, i.e. with a stagnant international demand, has little opportunity to grow: domestic income, as well as wages and investment, do not grow with world income. Therefore dynamic economies, producing goods for which demand increases are closer in magnitude to world income increases, diverge from stagnant ones for which the likelihood of changing specialisation becomes increasingly difficult, thus ending in a poverty trap.

Due to the large differences in the treatment of technology, sectors and trade across these models, we briefly describe their main features with reference to one of the seminal contributions (Verspagen, 1993). These models aim at explaining long-run dynamics, paying particular attention to countries' trade specialisations. Very much in the spirit of the post-Keynesian approach,

[20] Schumpeter put technological change at the centre of economic analysis and sought to explain a number of economic phenomena focussing on innovation dynamics. These phenomena imply changes in different aspects of the structure of an economy such as sectors, firms within sectors, firm size and organisation. With reference to the long-run, Schumpeter related innovation dynamics and the emergence of periodical radical innovations to the unbalanced dynamics of the business cycle. Central to his analysis were the concepts of innovation, the innovative entrepreneur (both in technical and social terms), the large corporation with access to innovation funding and the increases in efficiency due to the replacement of incumbent old technologies with new ones (creative destruction), all of which seem to point to the focal role that industry plays in a country's growth.

demand is a fundamental determinant of growth. The macro framework is often based on the balance of payments constraint (Thirlwall, 1992). Thus, the 'global' economic system is constituted of different open economies, comprising different sectors, each of which produces a different good, each exhibiting a different demand elasticity (in national or international markets) and labour productivity. Wages are endogenised as a function of productivity and the relation between demand and supply (unemployment rate). Given the difference in the cost structure across sectors with unchanged consumer preferences, sectors across countries are selected by international demand on the basis of the technology of the goods produced. Moreover, similarly to Pasinetti (1981), consumer preferences are often non-homothetic (they change with income), adding another element of selection. In this way, the models usually reproduce the cumulative causation dynamics stressed by Kaldor. Technology is usually simplified with respect to the more micro-based approach (see below), and technological change is a function of learning in the spirit of the 'Kaldor-Verdoorn' law. This means that productivity changes endogenously through investment (capital embodied technical change), learning, economies of scale and capital renovation (vintage capital) as in some of the NGT models, although modelled in a different way,.

The bottom line here is that a country that exhibits specialisation in sectors with increasing demand elasticity on the international market and has invested sufficiently to increase productivity with respect to competing countries will experience a further increase both in sectoral demand and investment and thus in future productivity. A further increase in productivity makes the country even more competitive. On the contrary, countries that are specialised in sectors with low demand elasticity experience few export gains and little investment. They will therefore not increase productivity and are bound to stagnate in the long run. In line with Kaldor's view the dynamic sectors are the manufacturing sectors with an intense use of capital, while the primary sectors are likely to stagnate. In these models of structural change, more explicitly than in the NGT models, it is by assumption (or with reference to empirical evidence) that it is not agriculture but manufacturing, particularly the sectors with high content of knowledge and technology, that ignites the cumulative causation process of growth.

Another group of models build on the NGT framework and introduce structuralist features, thereby highlighting the relevance of the structure of the economy for representing growth dynamics. Leaving aside methodological and conceptual distinctions – which are considerable across the models discussed in this section but are out of the scope of this paper – these models mainly focus their analysis on the relation between income distribution and growth through the change in demand for differentiated goods (assuming away homothetic preferences) in closed economies. (Aoki and Yoshikawa, 2002; Föllmi and Zweimüller, 2008; Matsuyama, 2002). The main difference with respect to the NGT models surveyed above is that here product innovation occurs solely in the consumables sector and is directly related to changes in the structure of demand where preferences change with income. In the typical model, a new good is produced only when an initial demand exists, and it diffuses only when there is sufficient demand for firms to invest in its production and to reduce its production cost via learning (such that an increasing number of consumers with different incomes can access it). In a model in which the consumer decides with respect to both price and quality of the good Zweimüller and Brunner (2005) show, for example, that high-income inequality reduces the incentives to product innovation because the low-income classes

keep buying low-quality goods. In other words, the upgrading in the manufacturing sector occurs only in established firms that target the high-income class.

In the Aoki and Yoshikawa (2002) model, the growth of income of a country depends on the rate of invention and diffusion of new goods that emerge as the demand of incumbent goods reaches satiation. The important difference in this model is that 'upgrading', or an increase in quality, is not sufficient here as the demand is saturated, irrespective of the goods' quality. Instead, the creation of new markets is the main engine of growth. Improvement in quality increases demand and production but only to a limited extent. When saturation is reached, the endogenous engine of growth disappears. In other words, the invention of new products may create a new demand, and under the condition of product diffusion, income increases in a logistic fashion. The results implicitly point to the need of a manufacturing sector (or services) capable of creating new goods that satisfy new consumer wants – which is less conceivable for the primary sector. The authors refer to such a dynamics to explain the extent of the 'Asian miracle'.

All these models add important insights to the mechanics of the relation between industrialisation and growth, in which domestic demand is highly relevant for growth and needs to be stimulated by the creation of new markets. A grossly unequal income distribution does not provide any incentive to innovate and increase the quality of goods, let alone create new goods. This aspect was quite clear to some of the traditional development scholars discussed in the previous section 4.1, particularly in the structuralist and *dependencia* schools: to satisfy the demand arising from a grossly unequal distribution, high-income classes import luxury goods of good quality, and local production can focus on a limited number of standard, low-quality goods. As we have seen in the models discussed above, this structure backlashes on trade dynamics and international competition, suppressing even more the ability of a relatively poor and unequal country to produce new and good quality goods to drive industrialisation.

Evolutionary growth models

Both demand and structural change are of great relevance in the evolutionary theory of growth. Having discussed more aggregated models in the evolutionary tradition in the previous section, we now refer to the models that focus on the micro behaviour of production, consumption, or both, in the tradition of Nelson and Winter (1982). The Nelson and Winter (1982) model largely draws on the Schumpeterian view of innovation processes and places the firm as the main agent of technical change. Nelson and Winter use an appreciative understanding of firms' 'regular' behaviour and model firm innovation and investment decisions as a response to market conditions. Thus, firms innovate and imitate when they have the resources and are required to. In doing so, firms follow a satisfying, rather than maximising behaviour. Moreover, firms cannot choose a technique but need to move in the neighbourhood of their current technology. The model also represents industrial dynamics, with the fittest firms surviving and new firms entering. Features such as selection, firms' heterogeneity, non-equilibrium and industrial dynamics are at the core of most of the following evolutionary models of economic growth. It should also be noted that almost all these models focus on manufacturing sector, and by referring to firm dynamics, they implicitly refer to a corporation of an industry.

The first wave of evolutionary growth models focuses mainly on process innovation as a source

of endogenous growth based on one or two sectors (capital and commodities). Some contributions model technical change as 'quasi-vintages' (capital differs in terms of the technologies embodied, not in terms of its vintage as time in use) (Silverberg and Verspagen, 1994b,a). Other contributions consider disembodied technical change and variation in labour productivity (Chiaromonte and Dosi, 1993; Dosi et al., 1994), which represent a two-sector economy where both sectors are manufacturing: capital goods and consumer goods.

With the focus on the resources to invest in finding new technologies, on the hiring of skilled labour or scientists for the R&D process (as in Chiaromonte and Dosi (1993)), on the imitation of firms that try to be more successful in the choice of techniques with respect to competitors, emphasis is once more placed on the industrial sector where the use of capital is more intensive. In other words, although innovation, imitation, learning and selection are found in all sectors of the economy, the evolutionary growth models assume that these factors are stronger in the manufacturing sector which is why industrialisation is essential to growth in these models. It could easily be argued that these models mainly address industrialised economies.

A more recent wave of evolutionary models places more weight on the sectoral transformation of economies and the changes in demand so as to better account for the processes of transformation that have been observed in the long-run dynamics of development (Metcalfe et al., 2006; Saviotti and Pyka, 2008, 2004). Some of them integrate Schumpeterian and Keynesian features, thus modelling structural change on both the demand and supply side (Ciarli et al., 2010; Dosi et al., 2010). Saviotti and Pyka propose several models in which they interpret development as the creation of new sectors. In their models, an entrepreneur has an incentive to invest in a sector in view of the monopolistic profits that can be made initially. Once the sector is established, imitating entrepreneurs have an easier access to the sector (with uncertainty becoming lower) so that investment and production increase. As production increases with competition, demand is eventually saturated, technology becomes mature and firms are selected out of the market. This gives them a further incentive to innovate and eventually create new sectors. Thus, the more innovative entrepreneurs are, the larger is the number of new sectors and the larger the production, i.e. growth. The final result also depends on the pace at which consumers become knowledgeable for the new goods/sectors incorporating new service characteristics.[21] The authors' final conclusion is that a larger variety (more sectors) determines higher economic growth. The term variety can be interpreted in a highly general sense, including the change from an agriculture-based economy to the production of manufactured goods and services as well as the number of manufacturing goods; ultimately the interpretation will depend on the sectoral aggregation assumed.

Ciarli and Lorentz (2010) and Ciarli et al. (2010) are novel attempts to represent different dimensions of structural change of the type occurring in a process of long-run growth, namely the emergence of new sectors, the change in production technology, the growth of firm size leading to corporate production and the related changes in the demand side regarding the distribution of income and consumption patterns. One of the main results of Ciarli and Lorentz (2010) is that the shift from pre-Malthusian to post-Malthusian growth[22] strongly depends on related aspects of

[21] Similar to Aoki and Yoshikawa (2002), the main driver of growth here is to escape satiation. Although Saviotti and Pyka somewhat simplify the demand side and avoid meddling with income distribution, they describe an endogenous Schumpeterian mechanism for the emergence of new sectors.

[22] Here pre-Malthusian growth refers to an increase in income that is mainly linked to the population growth, and

the transformation of an economy – rather than on one aspect at a time, *ceteris paribus*. Take-off occurs only when, in the economy, there is an increase in firm size sufficient to introduce demand heterogeneity, but at the same time the increase in firm size is not characterised by an oversized increase in inequality (wage differences between different levels of a firm's organisational layers). Similarly, a faster transformation of the product composition of an economy (increasing product variety) increases overall demand only if there is a change in the demand structure (consumption patterns also change in the process). However, a too-fast change in consumption shares has a negative effect on growth because firms, in keeping up with the rapid changes in demand, do not have sufficient time to build competitive industries.

The bottom line here is that a change in sectoral/product composition has a number of positive effects in terms of increasing demand, allowing firms to escape satiation and increasing investment and labour. However, this should be accompanied by a number of complementary structural changes that generate enough demand for new sectors. Otherwise, we face the case discussed above, where an overly unequal society with a too-low demand for new goods does not induce product innovation and sectoral transformation of the economy. Finally, the model replicates the evidence that changes in demand have, from a historical perspective, been accompanied by radical changes in the organisation of production.

Unified growth theory

Recently, a number of models have been set up explicitly to study the transformation from a stagnant economy to a of rapid growth, with particular reference to the experience of the industrial revolution in Britain (Desmet and Parente, 2009; Galor, 2010; Lagerlöf, 2006; Stokey, 2001; Voigtländer and Voth, 2006). These models (subsumed under the general heading of Unified Growth Theory) explain the take-off of an economy and the transition from an agricultural to an industrialised economy.

In Galor (2010), the transition is explained by the interaction between population growth, the availability of technology and the incentives to invest in offsprings' education. During the Malthusian period population growth increases the demand for technology, the supply of inventions, their faster diffusion, the 'Smithian' specialisation of production and trade. The initial establishment of industrial production then increases the demand for educated workers, who have an incentive to invest more in the formation of human capital, reducing fertility. Subsequently, these changes in education give way to the transition to a growth process in which the increase in productivity is larger than the increase in population. These changes can be considered to follow a dynamics à la Nelson and Phelps (1966), who showed that an increase in skills does not only affect (the productivity of) current production but mainly the capability to adapt to technological changes and adopt new production techniques, thus speeding up their diffusion.[23] Initial differences in technological progress can therefore be explained by a number of factors such as property rights, Enlightenment, the application of knowledge to production (as, e.g., in Mokyr (2010)) or cultural

negatively related to real wages growth. While post-Malthusian growth occurs when the Malthusian trap is escaped and the increase in productivity allows for a much larger increase in income than in the population: population change is positively related with real wages.

[23] It may be relevant to note, though, that Nelson and Phelps (1966), for an empirical validation of the main hypothesis of the model, refer to the adoption of new technologies in agriculture: the adoption of more productive technologies in the US occurred relatively faster among relatively more educated farmers.

traits (more on these aspects below). Similarly, different patterns of change in human capital can be explained by institutions, access to finance, inequality, and so on.

In a different model, Desmet and Parente (2009) also introduce changes in product innovation which are related to changes in demand. The transition to sustained growth occurs when, due to a population increase, industrial firms in urban areas start process innovation and attract labour from rural areas. Migration then changes consumer preferences towards industrial goods. This, in turn, generates an increase in firm size and competition and a decrease in markups, providing an incentive for product innovation, which appeals to the increasing urban population.

In these models, industrialisation is not assumed to start from scratch but emerges as an interaction between technology, population and education. However, it is the manufacturing sector and its technology that demands skilled labour, thus providing an incentive for investment in education or migration to urban areas. This then triggers more technology and gives way to take-off, a transition from Malthusian growth to modern, sustained growth. The different timing of this transition readily explains the increasing divergence between different economies.

Political economy models

Since the work of North (1981) on the relation between economic change and institutional change, a large set of models (and empirical analysis) has been developed to interpret different aspects of institutional change related to growth and development (Bourguignon and Verdier, 2000; Acemoglu and Johnson, 2005; Greif, 2006; Acemoglu and Robinson, 2006; Adam and Dercon, 2009). As we did for previous theories, we discuss only a group of examples and model features that we believe are general enough to represent this set.[24] The focus of this literature is on how economic institutions shape economic incentives. These institutions are usually identified and defined as the rules of the game in a fairly broad sense from property rights to the rule of law.[25] The main aspect of these rules is that they allow to reduce variability in human interactions, thus reducing transaction costs in a New Institutional Economics framework. Moreover, different rules of the game shape economic incentives differently and provide important political economy outcomes. What is the incentive to respect a contract if there is no mechanism to enforce it? What is the incentive to give a good or money in exchange for a good or service when this is available at no cost? Or more to the point, what is the incentive to invest in an industry, if most of the investment value added goes to someone else such as, for example, an exporter or retailer with strong contractual power?

In more systematic terms, following Acemoglu et al. (2005), institutions determine the incentives to invest and organise production efficiently and determine the way in which gains from the increase in efficiency are redistributed among the population. Political institutions determine the *de jure* political power while the distribution of resources defines the *de facto* political power. These need not be aligned, and often they are not. However, both political powers determine political institutions (in the future) and economic institutions. The economic institutions, in turn,

[24] The interested reader is referred to a number of excellent reviews and discussions describing this literature in more detail: Acemoglu et al. (2005); Adam and Dercon (2009); Bertocchi (2006); Casson et al. (2010).

[25] This is relevant for at last two reasons. First, it allows economists to provide a reasonably bounded definition of a rather indeterminate concept. Second, and related to the first reason, it allows to limit the analysis to the direct relation between institutions and economic behaviour through economic incentives.

determine economic performance and the distribution of resources (in the future). Many contributions in this literature analyse the conditions under which those variables change over time and how these changes affect economic performance. Let us focus on a couple of examples.

A number of models study the transition from medieval societies with large landholdings to societies in which democracy goes hand in hand with industrialisation. For example, Acemoglu and Robinson (2006) show the relevance of a political elite in blocking innovation. The main argument here is that elite's power is eroded by innovation, decreasing the share of the future distribution of gains. The political elite prefers to maintain the status quo, inducing a social loss – and retarding any process of technological change and industrialisation – rather than use the opportunity to increase societal wealth, which would increase the risk of losing political power and of having to forgo the distribution of wealth in its favour. This also shows that, when a technology requires a small redistribution of *de facto* political power in order for it to be adopted, its adoption may, in turn, have a significant impact on the future change of political institutions, also accelerating future changes in technology and the increase and distribution of wealth. If, on the other hand, industrialisation is led by the same elite that holds political power and leaves this power unaltered, the contribution of technology and industrialisation to an increase in wealth is likely to be limited.

Other theories focus more on the role of institutions in determining the organisation of production. They show how, as a result of the historical heritage, cultures and past events, societies organise themselves differently and establish political power either based on kinship ties or on more formal rules of law. The main thesis of these theories is that societies organised by a rule of law have a much larger space for the division of labour and specialisation of production. This is because transaction costs are low throughout the society and not only within a limited kinship group. For example, Greif (2006) shows how two societies that successfully trade in the Mediterranean Sea, the Maghribis and the Genoese, develop in a highly different way, with the Genoese succeeding earlier in the process of modernisation. Though simplifying a rich analysis, one can state that this difference is due to the fact that the Maghribis successfully reduced transaction costs through their strong and widespread kinship ties. Given the relative uniformity of their society, they did not need a formal rule of law. At the other end of the spectrum, Genoa attracted a large number of migrants from different societies with no kinship ties, thus requiring the establishment of a formal rule of law. The existence of formal rules did not put up a limit to trade and hence to the extent of the division of labour and specialisation, which are at the core of the industrialisation process.

To summarise, the relation between institutions and industry is bi-directional. Institutions, through rules and incentives, define the way to accumulate wealth, while changes in the accumulation of wealth have potentially disruptive effects on political institutions and the distribution of power. On the one hand, the literature on political economy models seems to suggest that the process of industrialisation may be held back not only by unfavourable trade relations or poverty traps but also by the system of institutions that defines the distribution of power. Although most of this literature refers to a closed system, we should not leave out the distribution of international power, of political organisations and corporations.[26] On the other hand, this literature suggests that initial

[26] See, e.g., the question of preferential trade agreements with SSA that are linked to countries' governance dimensions, the biased trade relations despite governance concerns, when primary resources are needed (Grauwe et al., 2010), the changes in agrifood market governance with the increase in private standards (Fuchs et al., 2011), and the biased impact

steps towards industrialisation may have a strong effect on institutional change by redistributing political power and access to resources more equitably.

5.2 Trade and growth revisited

Recent evidence seems to concur on the strong relevance of trade specialisation for income growth. Funke and Ruhwedel (2001) show that product variety (as measured relative to the US) is correlated with countries' relative per capita income level. Saviotti and Frenken (2008) find that related variety (goods that are close in the product space) in export is a significant predictor for short-run growth across OECD countries, while the effect of unrelated variety (goods that are distant in the product space) is positive only in the long run. Hausmann and Rodrik (2003) show that for most economies (excluding those that have a relatively sophisticated production mix) a successful industrialisation requires concentration on a small number of sectors with high productivity. In seeming contrast to this result, recent works by Hidalgo and Hausmann (Hidalgo and Hausmann, 2009, 2008; Hidalgo et al., 2007), which have gained increasing attention,[27] show that the complexity of a countrys' export is a crucial determinant of income growth (and divergence across countries). Complexity is simply measured in terms of export diversification (export variety) and relative specialisation with respect to competitors. A complex country is one with a large variety in export, in goods that are exported by a low number of/ by few other countries (Hidalgo and Hausmann, 2009). Felipe et al. (2011) use the same measure to rank products according to their complexity and find that their export share is positively correlated with income levels.

It has been discussed earlier how some models explicitly predict the relevance of increased variety for growth (Aoki and Yoshikawa, 2002; Ciarli and Lorentz, 2010; Saviotti and Pyka, 2008, 2004). However, these results were valid for closed economies. Yet Hidalgo and Hausmann (2009) show that it is not only the variety of goods that is related to growth but also how many other countries produce those goods that explains the divergence in economic development across countries.[28] Hausmann and Hidalgo (2011) go one step further to explain why a diversified production of goods that are produced only in a few other countries is positively related to development. In their model, the production of each good is associated with the existence of necessary capabilities within the country, which are non tradable. The higher the capability content of a good, the larger is the capability endowment required for a country to produce it. But countries with an initial low endowment also have little incentive to invest in new capabilities because one new capability is of little use if the country produces a limited number of goods (as is the case when the diversity of goods produced is low). That country then finds itself in a "low quiescence" trap and will continue to produce a small number of low capability goods. The more capabilities increase at the global level, the more complex becomes the production of differentiated goods, and the less likely a low capability country is to catch up.

The relation between trade specialisation and growth differs when uncertainty is introduced. A number of papers explore how diversification and variety in industrial structure determine the

of contract farming on producers (von Hagen and Gabriela, 2011).

[27] A few scholars have started to investigate the properties of trade networks, e.g. Barigozzi et al. (2010).

[28] See also the discussion in Hausmann and Hidalgo (2011) on how their complexity measure differs from more traditional measures of product concentration such as the entropy index (Saviotti and Frenken, 2008), which does not distinguish between different products and how many countries produce them.

relation between trade specialisation and growth. In particular, diversification of exports (an increased complexity) acts as a growth-enhancing insurance device in the context of uncertain (trade) environments (Di Maio, 2008; Di Maio and Valente, 2013).

Galor and Mountford (2006), explicitly referring to the shift from agriculture to industry, postulate that it is the increase in trade relations after the industrialisation of one part of the world that determines the subsequent divergence in income growth. In fact, countries that started an industrialisation process increased per capita income, while countries with the largest part of their population working in agriculture experienced a growth in population. This is explained by the fact that returns from trade in industrialising countries were mainly used for investment in physical and human capital, while these were used for population growth in agriculture-based economies.[29] This argument is hardly different from other arguments that for long have denied that comparative advantages are the best trade policy – including the recent call by the World Bank for more active industrial policies Lin (2011).[30] An economy that specialises by investing in a nascent industry also needs skilled labour and can devote the increased income (from trade) to capture changes in knowledge and transform them into technology: usually, this also induces a demographic transition towards urbanisation and higher education. On the contrary, a country that has a comparative advantage in exporting raw materials to industrialising economies has no incentive to change and finds itself competing with no gains from trade in the short run. "Thus, the historical patterns of international trade reinforced the initial patterns of comparative advantage and generated a persistent effect on the distribution of population in the world economy and a great divergence in income per capita across countries and regions". Galor and Mountford (2006, p. 299)

The implications for the relation between industrialisation and growth are instructive, though not surprising, and are largely already known. Some exported products produce more income than others, and few countries develop the capability to produce them (e.g. because of the greater availability of required labour skills). These products also generate positive externalities, inducing more products to emerge (more innovative activity) and promoting the accumulation of skills and capabilities to match ongoing production and invent new products. This, in turn, expands the export basket, raising overall output and contributing to an increase in positive externalities.

6 Summary and final remarks

In this chapter, we have discussed a large set of theoretical arguments for industrialisation-driven development. We started off with the stage theories of growth and development, which postulate that all economies need to go through relatively well-defined stages of development. Interestingly, all stage theories indicate that all countries will eventually, more or less linearly, industrialise and reach the final stage of a modern high-income economy. But how to achieve this goal is a matter of disagreement among scholars. For instance, in the case of the Rostow, industrialisation automatically follows from an increase in investment with no or little need for intervention, while for Kaldor more targeted policies are needed to converge the investment in high-productive industrial sectors.

[29] See also Galor and Mountford (2008) for an empirical confirmation.

[30] See, e.g., Lin and Chang (2009) for a recent development in a debate that has been ongoing for many decades.

Similarly, when we consider balanced and unbalanced theories of economic development, the discussion dwells on how to make industrialisation happen and on the constraints that hold back the economy in a non-industrialised backward state. The bottom line is that industry breeds industry through intermediate demand, and intermediate demand gives way to a virtuous growth cycle. Although industrialisation is considered to lead more or less automatically to growth, some kind of state intervention is needed to kick off this process.

The first contributions to growth theory suggest that it is increased savings for capital investment that lead to a higher growth rate (when investments are realised), in absolute or relative terms, together with the technology determining the productivity of capital. In these models there is no explicit mention of a manufacturing sector, but the introduction of a general technology indicator as a determinant of growth, together with the focus on capital investment, suggest that technological change in sectors with higher productivity is the main engine of growth.

The requirement for investment in sectors in which a country may not have a comparative advantage but which have higher terms of trade and high-income elasticities is also regarded as a crucial aspect in the process of economic development by a large number of trade theories (and policies such as import substitution).

At the turn of last century, both growth and economic development theories started to investigate the sources of productivity and the role of intermediate good producers. In the New Growth Theory there is no mention of the role of manufacturing with respect to other sectors. However, it is manufacturing who is more likely to gain from various sources of increasing returns: investment externalities, human capital or improved intermediate goods. Ultimately, manufacturing is conducive to growth because if it is assumed to benefit from the positive externalities.

When we turn to theories that explicitly model structural change, the assumption is that manufacturing – with a higher content of skills and knowledge – is more competitive on the international market than agriculture, which justifies the role of manufacturing as a source of growth. Some of these models add valuable insights on the demand side effect, that is, on the relation between the initial distribution of income and growth through new, modern products: an unequal society does not provide any incentive to innovate and increase the quality of goods, much less create new goods. Such a society is thus less likely to industrialise.

In the evolutionary tradition, on the other hand, it is firms' technological behaviour that plays the central role in growth dynamics. There is an implicit assumption that innovative firms are present mainly in the manufacturing sector and that it is therefore the manufacturing and high-tech activities that enable a sustainable growth pattern. Some of these models also show that a change in the sectoral composition of an economy enables an increase in demand and thus in investment and employment. They also show that these sectoral changes need to be accompanied by changes in the organisation of production structure, namely the transformation from workshops to corporate firms, which is again mainly a feature of the manufacturing sector. Moreover, sectoral changes require a relatively equal distribution of income in order to ensure sustainable growth, which is in many cases a feature of industrialised rather than rural (feudal) societies.

Unified Growth Theory models do not assume industrialisation to start from scratch but to emerge as an interaction between technology, population and education. However, it is assumed that it is the industrial sector that uses the technology that, in turn, requires educated labour, thus

providing an incentive to invest in education or urbanisation. In other words, these models are interesting devices to explain how the transition from agriculture to industry occurred, and under which assumptions ultimately, industry sustains growth..

Political economy models provide important insights on the relation between institutions and industrialisation. For example, institutions that favour the vested interests of a ruling elite may hold back any form of innovation likely to redistribute economic and political power, including technological change and industrialisation. Cimoli and Rovira (2008) show evidence on the vicious cycle between rent seeking behaviour of elites and a country's specialisation in primary resources.[31] However, small steps towards a new system of the distribution of resources and *de facto* political power, possibly along with small investments in industry, may have a large impact on institutional change and lead to sustained growth. Institutions are also seen as a fundamental explanatory variable of the emergence of trade and division of labour, without which industrialisation does not take place. The political economy models explain differences in the growth rate as differences in the division of labour, which are an outcome of the institutional context.

Finally, the implications of the modern theories of trade, growth and development are conceptually similar to the old structuralist theories of trade: income growth of a country gains from producing a large number of products that are more competitive than others on the international market. These theories also imply that a country develops capabilities to produce these goods, which have a positive effect on future innovation (an autocatalytic process). The product space that is more conducive to such dynamics is manufacturing.

This summary shows that, once accounted for the large differences in methodology, assumptions and the more or less explicit reference to sectors, the manufacturing and capital sectors are assumed to be central to growth and economic development across a large set of theories of proposed during six decades. As we have highlighted in a number of occasion, in many cases the reference to manufacturing can only be induced by the correlation between empirical evidence and model assumptions; in a number of other cases, instead, manufacturing is explicitly modelled as the sector explaining growth. However, at least three crucial aspects of growth and economic development should be discussed further before any conclusions can be drawn from this theoretical excursus. Below, we only mention them, leaving a fully-fledged discussion for future research.

First, the *objective*. All theories reviewed here are well grounded in the assumption that income growth is the only policy objective, and most of them do not make any particular distinction between income growth and economic development. However, development is a broad term that may or may not include income growth (see, e.g., Sen (1994, 1979) or more recently Stiglitz (2009)), but it can certainly not be equalised to income growth. In other words, if growth and development constitute two sets, growth may be fully included in development; they may intersect; or be completely disjoint.

Moreover, structural change does not happen exclusively in terms of a change in the sectoral composition of an economy, leaving the rest equal. Some of the contributions reviewed here have made clear that structural change occurs in several dimensions: demand, organisation of labour, education supply and demand as well as massive urbanisation, distribution of political and economic power and opportunities, job displacements and changes in the prices of primary

[31] See also Auty (2001) for a wider discussion on the natural resources curse.

commodities and goods. Most of these changes are related to income distribution – which may have effects that hold back growth – or to the displacement of masses replaced by a dam or an industrial investment.

In our review, we have mentioned no theory that endorses manufacturing and also addresses the collateral aspects of industrialisation.[32] These crucial aspects should not be taken for granted. In particular, what needs to be considered first is the objective for a specific country, or region, which aspect of development should be and which effects this might have. A policy that aims to tackle inequality is probably different from a policy that has income growth as its sole objective.

Second, the *conditions*. Each theoretical argument in favour of industrialisation-driven development identifies different conditions for this to happen. We have shown that institutions may play a significant role in promoting or hindering industrialisation. We have also shown that one explanation for income divergence across countries in the last couple of centuries may lie in trade patterns linked to the positive feedback loops between trade specialisation and the formation of domestic capabilities. Inequality, or access to resources, is another relevant dimension here.

The bottom line is that even when the final objective is industrialisation-led growth, increasing capital investment will not be sufficient to achieve this objective. A large body of literature, particularly in the evolutionary tradition, has underlined the need to build the capabilities necessary to change, learn, acquire and understand radically different technologies such as manufacturing for an agricultural economy, production using the new technologies, and innovation to increase the variety of the product space(e.g. Bell and Pavitt, 1993; Abramovitz, 1986; Katz, 2001; Kim, 1997; Amsden, 1991).

This capability dynamics is related to the institutional setting, probably going beyond the institutions that shape economic incentives, and crucially to the activity of entrepreneurs, social or business, who take the risk of investing in and adopting new technologies (Naudé, 2010; Nelson and Pack, 1999; Stiglitz, 2011), as well as to the role of macro economic uncertainty (e.g. Katz, 2001; Cimoli and Katz, 2003).

Third, *increasing returns*. The results of most theories reviewed here depend on an a priori assumption that manufacturing is the one sector that shows increasing returns to investment due to externalities, technological change and human capital, as opposed to agriculture. However, it should be carefully considered which are the sources of increasing returns in an economy. Knowledge, beyond technological capabilities, is certainly one of these sources: there are sources of knowledge that extinguished by the sudden transformation of an economy, giving way to a new productive regime. Other sources of increasing returns are related to the clustering of economic activity due to agglomeration dynamics, social capital, spillovers or fragmentation of production. A further exercise for future work in this area is to analyse whether increasing returns continue to be the exclusive feature of manufacturing, and to look more deeply at different patterns of sectoral of innovation and positive externalities at different stages of growth and development.

With this paper we have aimed at providing a systematic, though selective, review of a rich literature on growth and economic development, highlighting the different understandings with respect to the relevance of industry as a source of growth. We have also shown that in many parts of this literature, the superiority of industry is implicitly assumed or observed rather than

[32] The economic development literature does not lack discussion on urban bias, agricultural development, distribution of land, poverty, inequality, migration, basic needs, and the like.

explained. Our hope is that by clarifying these assumptions, we have placed more emphasis on the unresolved issues that form the basis of the different theoretical arguments for industrialisation-led economic development. Any development policy that focuses on industrialisation should weigh these arguments in relation to specific objectives and contexts rather than taking them for granted. The large array of literatures surveyed here should serve as an initial menu of ingredients. The recipes (if any) require much more analysis in the line of the work done by Rodrik (2010, 2007), which must, however, be left for future research. By focussing on manufacturing we have explicitly decided to leave out the role of the service sector, which is crucial in the process of growth and structural change. We suggest that another review is needed to analyse the different ways in which services are assumed to sustain growth and economic development in the respective theories.

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