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KNOWLEDGE AS CAPITAL. HOW THE ORGANISATION OF PRODUCTION IMPACTS ON LOCAL DEVELOPMENT

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ABSTRACT

This paper addresses the organisation of production and how it impacts on the development of economic systems. We consider production systems from a knowledge perspective, looking at how the inputs to production are enriched both by the 'skills, dexterity and judgement' of labour, and by the knowledge incorporated in technologies. Our main finding is that production activities impact on local systems by activating either virtuous or vicious cycles of capital accumulation, where by capital we refer to the knowledge incorporated into technologies, human resources, and production relationships. The division of labour across firms and localities, in particular, has been accentuated by the increasing complexity of knowledge contents in production. Complementary functions are compatible, however, with a hierarchy of activities characterised by different levels of knowledge contents and by different levels of economic power. In particular, in those localities where strategic decisions in production are mainly taken by firms according to their own objectives, the direction towards which local economic systems move could be contrasting with the development objectives shared collectively. We argue that knowledge is not a sufficient condition to retain strategic decision-making power in production, but it must be associated to the capability to exert voice effectively.

Key words: Knowledge, Division of labour, Capital accumulation, Development

JEL classification: O14, L0

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1 INTRODUCTION

This paper addresses the organisation of production and how it impacts on the development of economic systems. We enquire about the directions that local development can take according to the way production is organised. To start with, we recall that Smith magisterially emphasised the nature of the relationship between the way production is organised and improvements in labour productivity. In this respect, the division of labour has been pictured as one major determinant of what has been called the 'wealth of nations'.

On the face of it, after Smith, the organisation of production has been often addressed, focusing on the productivity advantages that derive from an efficient division of labour. However, here we aim at making another aspect flourish. We consider production systems looking at the knowledge incorporated in production processes as well as into products.

There are two reasons for considering this perspective. Firstly, products - as Smith states - represent what the productive activity adds to the inputs of production.[1] To say it differently, the process of production, which transforms inputs into marketable products, is composed by a number of activities that can add value to the initial inputs. We argue that this rise in value is not an obvious outcome of the process, but it is made possible at various levels by the knowledge required to undertake particular activities in a particular way.

Productive activities, in particular, include five complementary sources of knowledge: labour, technology, organisation, relationships, and the socio-economic system where activities are located. Knowledge is relevant to the extent that these five elements add value to production activities. All these factors have increasingly augmented their complexity and have, consequently, contributed to amplify productive specialisations. As a consequence, for instance, linkages amongst firms have become a strategic element of the organisation of production. Organisational, relational, as well

as technological factors require to a large extent the possession of specific knowledge, such as the knowledge which is necessary to organise labour effectively and make use of technologies, or the individual capabilities and skills which enable individuals to undertake specific activities. In addition, besides individual and organisational knowledge, production requires machineries or, in other words, the tools to produce. These are products that, differently from consumption goods, serve the production of other commodities. But like consumption goods, they incorporate knowledge, and the more is the knowledge that the machinery integrates, the more is the value added that it can provide to production.

The second reason for taking a perspective on knowledge is related to the first and addresses the impact of knowledge on the development of localities. The activation of capital accumulation, in particular, has been considered one fundamental factor of economic growth and, at the same time, obstacles to capital accumulation have been put among the major barriers to the improvement of economic conditions.[2] More specifically, the analysis of elements that impact on capital accumulation is related to the capacity of localities, regions and nations to increase their productivity, which means an improvement of the relation between income and capital. This presupposes, amongst other things,[3] technological innovation, learning, access to information and knowledge about processes and markets.

The specialisation of functions has contributed to differentiate the knowledge content - in the form of human capital or capital goods - required by distinct production activities. Here we anticipate, as we will further claim in this work, the strict relationship between knowledge and capital. If, for instance, we see the knowledge incorporated into labour and technologies as capital (human and physical, respectively), then we can relate capital accumulation to the constant improvement of the knowledge basis necessary to undertake productive activities. The development of local economic systems – being related to capital accumulation – is, therefore, strongly

influenced by the configuration of the knowledge accumulated through the establishment of specific production functions on the territory.

Previous theoretical contributions on knowledge have emphasised the nature of knowledge as an incomplete and fragmented entity that is constantly evolving. In particular, Hayek's theory of knowledge addresses aspects of mental processes of knowledge acquisition, communication amongst individuals, as well as the capacity of individuals (through learning) to adapt to their external environment.[4] These cognitive foundations have been incorporated by approaches to the theory of the firm that, building on Penrose[5] have focused on the capability of firms to make use of tangible and intangible resources to obtain marketable services. In line with this perspective, differences between firms have been explained in terms of their capabilities and in their perception of opportunities.[6] In particular, the implications of the approach to knowledge that we find in the work of Hayek and Simon have strongly shaped the economic theory of 'path-dependence'.[7] The merit of such approaches is in understanding changes inside firms not only in terms of transaction costs, but also in terms of learning, previous experiences, sunk and switching costs, technological opportunities, selection and complementary assets.[8] Path-dependence, in particular, has been especially useful to industrial economists looking at technological change inside firms. Instead of something exogenous and with the characteristics public goods, technological knowledge has been recognised as endogenous, highly idiosyncratic and specific.[9] The opportunity of a firm to introduce technological change has been related to market conditions, with the firm's pre-existing organisation, with its history, size and specialisation, where specialisation is often the outcome of the firm's intentional efforts in research activities.[10]

The assumptions that underlie path-dependence can provide a useful background to the perspective that we want to develop in this paper. In particular we acknowledge that: a) actors decide on the basis of imperfect information and partial knowledge of phenomena; b) actors are different –

for various reasons – in terms of their ability to learn; c) previous decision (for instance in terms of sunk or switching costs) may have irreversible effects on the future opportunities of actors. At the same time, however, concepts of knowledge and change have not been used in the literature to re-consider the role of production factors (such as capital and labour) in the broader context of development. Accordingly, in this paper we develop on previous contributions to provide a view on three phenomena that, to our knowledge, have not been addressed in the same terms before:

1) the relation between knowledge and capital accumulation;
2) the relation between production decisions of firms, on the one side, and the creation of knowledge and local development on the other;
3) the relation between knowledge and economic power.

After having briefly introduced - in Section 2 - the knowledge concepts that we will use in this work, in Section 3 we offer a perspective on those aspects of production that are mainly related to knowledge. We refer, in particular, to the nature of capital and to the value of products. In Section 4 we apply the theoretical considerations of the previous section to the development of local production systems, looking at the conditions that may favour or hamper capital accumulation. Section 5 addresses the international division of labour and how the organisation of production impacts on knowledge formation and power distribution amongst different economic systems. We end this paper by re-considering local development in the light of actual trends in the international division of labour.

2 KNOWLEDGE CONCEPTS

The concept of knowledge has been used in different ways. One major difference can be found in its use as applied to individuals, organisations, and institutions. The conceptual effort of going through different analytical objects is determined by the complexity of this concept, which cannot be

identified exclusively with the individual sphere or the collective sphere represented by institutions.

Although we can say that individual knowledge is subjective because it is linked to the cognitive sphere of individuals, the process of learning, both at the individual, organisational, and local level, is collective and involves social interaction. Learning is a process that refers to the acquisition of scientific and codified knowledge (the knowledge codified in a book), to the interpretation of external stimuli (the knowledge that individuals derive from observation of the external world and the ability to adapt to such stimuli), to the imitation of other people's actions (the apprentice who follows the master's deeds). The interaction with the environment, as well as communication amongst individuals, is therefore a fundamental aspect of knowledge and learning dynamics.

In particular, following Hayek's theoretical contribution to the theory of knowledge, we will refer to individual knowledge as the subjective interpretation and use of the pieces of information that comes from the environment. It can be knowledge about social norms, natural phenomena, specific activities, etc. As the cognitive sphere of each individual is different, each individual retains unique pieces of knowledge.

When referring to technological knowledge we mean the individual and organisational knowledge that is required to undertake specific production activities. It includes also the knowledge incorporated in production machineries and technologies.

Knowledge inside firms and organisations in general requires a conceptual leap. It subsumes the knowledge of individuals that is relevant to a firm's activities, but also the knowledge institutionalised in the norms and routines that have cumulated over time. Knowledge is reflected in the amount of competencies internal to the firm. However, it is not only productive knowledge that requires an appropriate organisation. Firms need both internal and external organisation to provide a framework to develop and apply their capabilities.[11] In this sense, setting linkages with other actors

may make available more opportunities for firms to access and make use of the knowledge they have acquired.

If we enlarge the perspective to production systems, we talk about localised knowledge, which consists of the capability to learn and internalise the knowledge diffused in a particular space of production (a geographical space or a virtual community of actors), and to recombine it with the individual knowledge of each actor. Marshall's industrial atmosphere,[12] for example, was the tacit and unexpressed knowledge that the inhabitants of the industrial district, from children to adults, could absorb just because of coming into everyday contact with the mesh of activities and social relations occurring within the geographical space of the district.

3 KNOWLEDGE IN PRODUCTION: A PERSPECTIVE ON CAPITAL AND ON THE VALUE OF PRODUCTS

The argument to be presented starts from the firm producing goods whose natural value - as opposed to market value[13] - is embedded in the knowledge required to produce it. During the production process, inputs are enriched from five complementary forms of knowledge. One is the knowledge of individuals, which is reflected in their 'skills, dexterity, and judgment'. The second is the knowledge incorporated inside capital goods or, in other words, the technology and the tools used to undertake production activities. The third form of knowledge is organisational, rooted in the routines and practices of the firm.

Production, however, does not occur in a vacuum, and increasing specialisation requires network relations and co-ordination amongst firms. Firms would not commit to specific investments if they do not know that outside there are other firms specialised in complementary activities.[14] A fourth form of knowledge is therefore relational, and it directly reflects the capacity of firms to use the knowledge of other firms by means of co-ordination. The fifth type of knowledge that is relevant to production is localised knowledge, or as we said, the knowledge diffused within a specific

space. The remainder of our analysis mainly contributes to an integrated study of individual, technological and relational knowledge, and to their interplay with local development.

Building on the Smithian perspective, we first consider how the natural value of a product can be increasingly determined by the ability required to produce it (the technique) and by the knowledge added during the process of production. The source of such value, according to Smith, is labour. In particular, the value of a good exchanged in the market is measured by the amount, the degree of hardness and the skills required for its production.[15] The knowledge that a worker must cumulate in order to produce implies his or her involvement into a process of learning. A focus on labour, therefore, stresses the importance of human capital and continuous learning not only for those activities that are directly linked to research and development, but also (where Smith would probably say 'especially') for those workers who are directly involved in productive activities. Besides physical capital, investments would also be directed to renew and increase labour's knowledge.

In parallel to the skills, dexterity, and judgement capacity of labour, when workers undertake production functions they make use of tools and machineries. These means of production embody the knowledge of those who designed them. In this sense, *we understand capital goods as a combination of knowledge and matter*.[16] The boy described by Smith who 'was constantly employed to open and shut alternately the communication between the boiler and the cylinder … observed that by tying a string from the handle to the valve which opened this communication to another part of the machine, the valve would open and shut without his assistance, and leave him at liberty to divert himself with his playfellows'.[17] The innovation introduced by the young boy was then installed as a standard technology in subsequent engines, and production activities could benefit from the knowledge that that young worker was able to imprint in the earlier machine.

This example focuses on the exceptional intuition of its inventor, who was not even totally aware of the consequences of his discovery. The process that leads to innovation, however, might be more complex. Although today in traditional industries, such as textiles or mechanicals, technological improvements are devised almost exclusively by machine makers and are potentially accessible to all, industries that are in an early stage of development or are rapidly changing, such as pharmaceuticals, employ technologies devised for their own use. The knowledge content of specific technologies or materials is often the outcome of research activity, undertaken inside the firm or in partnership with external actors (for instance other firms, research centres, universities). Research requires investments in the development of specific knowledge and in human capital. But again, even where new technologies are the result of long processes of research, the human element is fundamental for the advancement of science and technology.

We have maintained that the value of a good can be related to its knowledge content. Suppose now that we are in front of a product characterised by a superior content of knowledge, either because it is the outcome of a long process of research and development, or because it represents the application of the experience and intuition of the entrepreneur or, again, because it requires the use of highly advanced machineries and skilled labour. The relevance of such a product must be recognised by the market or, in other words, it must meet consumer needs. Production, as Karl Polanyi stressed,[18] is a combination of goods. This perspective, which directly builds on Menger,[19] emphasises that there are combinations of goods that are useful only if they serve to satisfy - directly or indirectly - consumer needs.[20] In this sense, value is given to goods by their utility. Therefore, in addition to the knowledge necessary to manufacture the good, production requires the knowledge of the existing causal connection between combinations of goods (which, we have maintained, embed knowledge) and needs.

This point of view adds to the idea that value is determined by the knowledge incorporated into products. It tells us that the knowledge content is not a sufficient condition for a product to be sold in the market. If the specific knowledge of a good is not recognised as useful for satisfying a specific need, than that good cannot be produced, even if there is the knowledge to actually manufacture it.

This association between knowledge and its perceived utility occurs in the market. However, since individual knowledge is partial and incomplete,[21] individuals do not have the explicit knowledge to recognise the knowledge insights of a product, or to explicitly identify its utility. Nor can this recognition be left to price determination mechanisms, as important parts of knowledge are tacit, or veiled by information asymmetries, a condition which implies that price determination submitted to individual preferences can at best be an approximation of the real value of goods.

Since not all individuals have explicit knowledge of all the elements that are part of a product (such as the skills of the worker, the technology incorporated in the machines used to produce it, the quality of alternative materials and their impact on human health and environment), there can be no guarantee that the market selects the best product.[22] For this reason, the specific knowledge of a product is substituted by a more comprehensive assessment that might rely, for instance, on individual preferences, values or beliefs. As Menger noticed, if we accept a product as valuable, we - in a sense - commit ourselves to believe in the yet undisclosed value and utility of the product.

Although consumers (such as individuals, families, firms, public agencies) are subject to imperfect information about consumption or capital goods, an assessment of the market value of products can be linked to the evolution and diffusion of technologies within industries. In traditional sectors of the industry technology has become standardised, orienting industries towards cost competition.[23] When the knowledge content of products becomes standard and access to the industry is not discriminated by technology,[24]

then markets tend to privilege products with the lower price. Markets, in this case, do not recognise the high knowledge (here meaning innovative) content of traditional production. Therefore, decisions taken by firms to delocalise low value added activities (i.e. activities with a relatively scarce innovative content) where generic work is cheaper or, more generally, to concentrate activities where there is the knowledge to undertake them and the cost of labour is lower, depend also on the value that the market recognises to products. As a consequence, advantages in terms of labour costs push towards the location of traditional sectors into less developed regions. In terms of investments in human resources, this means that those localities that mainly attract traditional industrial activities may be subject to a lack of investment for the improvement of machineries as well as for the skills and knowledge of the local labour force.

In parallel with the technological convergence that has occurred within a number of industries, production activities have undergone a process of increasing specialisation.[25] On the one side, specialisation has reflected the growing complexity of the knowledge required by production. This has contributed to determine a reorganisation of activities amongst firms, which have specialised in different phases of the process of production. On the other side, industries have experienced the introduction of a relatively small number of production processes, which are similar for a large number of industrial sectors. Therefore, the development and use of knowledge requires increasing co-ordination amongst firms. If a firm has to specialise in the production of a specific part of a more complex good, either it must have some command of all other complementary goods, or it must be sure that other firms will produce those complementary goods. In addition to what we have argued so far, these considerations permit to further infer that knowledge specialisation is dependent also on the development of production systems where a multiplicity of activities are undertaken and where firms can co-ordinate their production with those of others. In particular, complementarities in production may be within a local system or

across territories and can activate different development directions according to the value added of the knowledge they involve.

Up to this point we have said that activities presuppose various forms of knowledge, amongst which human, physical and relational are of particular relevance to understand developments in production. We maintain that - by virtue of the value insights that these elements transfer to production - human, physical, and relational knowledge can be considered as specific forms of capital. Consistently, we see the creation of localised knowledge as a process of capital accumulation, where by capital me mean knowledge and, in particular, a combination of human, physical and relational elements. Essentially, production processes combine these complementary forms of capital to obtain goods that are recognised as valuable by people.

4 KNOWLEDGE AND THE DEVELOPMENT OF LOCAL PRODUCTION SYSTEMS

The theoretical background has now been laid for a treatment of the thread linking production and local development. The role played by knowledge in the organisation of production allows us to emphasise some constituent elements of local systems. We have mentioned that capital accumulation, which in our connotation is the accumulation of the knowledge embodied by physical, human and relational capital, depends also on the value of production activities that occur within a given space. If the value of goods produced within a locality is recognised by the market as well, then production could activate a virtuous circle of wealth creation.[26] According to the intensity of the knowledge involved in production, local systems can follow different trajectories, with respect to the formation of physical, human and relational capital. Types of production characterised by higher levels of knowledge can generate collective dynamics that favour capital accumulation, in terms of the technology used, learning, and relationships.

The development of human capital reflects individual knowledge and competencies and it directly impacts on the progress of the tools used in

production, which constitute physical capital. The example provided by Smith about the improvement occasionally introduced into an engine by the intuition of a young worker explains this relationship very well. However, when production is composed of low value added activities, or when firms absorb knowledge from a locality but do not release some of their knowledge into the system where they are established,[27] capital accumulation may be seriously hampered. In this case, the relation between knowledge and capital accumulation can activate a vicious circle, which averts the local system from the process of knowledge accumulation.

Localities where the cost of production factors is relatively low may not present an incentive for those who retain capital (here meant as financial capital) to introduce more advanced technologies.[28] If, for instance, with respect to some traditional activities, technological forces and labour forces are in competition, and the former are used when the price of the second increases, very low labour costs would block the introduction of new technologies. Countries where capital hires 'hands' and not higher-level capabilities, will keep low salaries and stick to obsolete technologies. In parallel, this lack of 'technological ambition' would impede developments of technical knowledge and of learning horizons of labour forces. A cumulative vicious cycle that blocks knowledge and salaries towards higher levels would thus be activated, producing a negative collective effect.

This view is, of course, extreme. There can be situations in between, for which technological change is not just a matter of its convenience with respect to the cost of resources. Technological change, for instance, may be indispensable in order to maintain productive activities. When machineries transfer their knowledge content to products, they do it partially, due to a process of deterioration.[29] Over time, the same piece of physical capital changes its value and price[30] and, therefore, the value transferred to products changes every year as a function of the age of the technology used.

The capital structure, therefore, evolves over time. On the one side existing technologies deteriorates, whilst on the other new knowledge is embedded by new technologies. Old tools and processes are supplanted by new ones.

When, for instance, the international division of labour necessitates systems of production that are able to function with common standards of speed, technologies need to be also harmonised with respect to production times and specific standards. The maintenance of capital is, consequently, a matter of maintaining its complementarity to the rest of the changing capital structure than merely preventing decay.[31]

With the division of labour amongst highly specialised firms, localities become identified with the typology of activities that are located in it. In particular, the knowledge content of the phases in which firms specialise contribute to determine the strength or the weakness of a locality, by effecting the competencies and the value added which can be found within its borders. The levels of knowledge required for specific activities may be so high that those productions that require the highest values of knowledge (and which produce also the largest value added for societies) will be concentrated in geographic areas where structural conditions - for example, schooling, or 'good governance'[32] - facilitate an effective use of advanced technologies. In contrast, regions or countries with the lowest levels of education and technical knowledge will be chosen by capital for the location of low value added activities, with scarce knowledge contents. If this happens, salaries - in these regions - would be at the level of subsistence or even lower.

Although classical economists viewed technological change as a way to substitute labour with capital, an exception was represented by the substitution between the amount of labour freed by the user of the new technology and the amount absorbed by the industrial sector that produced that technology. Technological dynamics - and therefore production dynamics - allow for the development of activities (the production of industrial machineries) that are complementary to the production of

consumption goods. Therefore, the impact of technological developments on labour is not just in freeing the labour force, but also in generating the capacity of backward and forward sectors to absorb part of what technology has substituted.

By virtue of the mobility of factors and of the international distribution of resources, the substitution of labour from one sector to another, however, may not happen in the same region, or country. When the location of the sectors that produce new machinery is different from the location where labour undergoes the main effect from the introduction of new technology, backward linkages are activated in a different locality leaving to the first locality, in the short time, an additional cost to bear. The previous hypothesis, then, could hold also in this case. Backward linkages, depending on the level of knowledge and salaries of the economic system, will be activated where there is the knowledge to develop technologies effectively, leaving those with the poorest knowledge basis in a vicious cumulative cycle of generic and low value added competencies.

5 STRATEGIC DECISION MAKING IN PRODUCTION AND THE INTERNATIONAL DIVISION OF LABOUR

The reason we address knowledge and learning in production with respect to local systems is essentially related to a concept of development which is based on the ability of a locality to go towards community-determined goals. This view is essentially different from the one that has originated from the 'Washington consensus'. As Sugden and Wilson[33] have recently emphasised, actual development indicators reflect a concept of development/underdevelopment that, although comprehensive of various social and economic elements, has been elaborated and imposed by actors who are 'external' to local realities. While the current approach to the meaning of development denies diversity of developmental aims and objectives in different contexts, a change in perspective would shift evaluation from externally determined parameters to the understanding of

the specific objectives defined inside local contexts. Each locality would then be 'developing' or 'not developing' on the basis of its progress towards community defined objectives, rather than on some criteria *decided* by actors *outside* the local context.[34]

The accumulation of capital that, in our view, has been treated as knowledge accumulation, is a key factor for the development of local production systems. Learning and technological dynamics can activate a virtuous cycle of knowledge generation and accumulation. This can be beneficial for local systems, both because it augments the value added produced and because it impacts on the ability of local communities to shape development objectives.[35] Capital accumulation, however, is not exempted from generating conflicts and continuous tensions, either amongst social groups, regions or nations. Phenomena like these could be interpreted as the result of the eventual discrepancies that arise between the objectives motivating firms' strategies and the consequences (more or less unintended) that are generated at the collective level.

More specifically, the interaction between firms' strategies and the collective sphere can be the result of the purposefulness of actors - it can be intentionally determined - as well as the outcome of unintended consequences, which were neither the intentional nor the conscious objective of firms' actions. The actions undertaken by firms (which we consider here as economic actors with their own aims and strategies) can - in turn - impact on societies either in a positive or negative way. For example, we can talk about positive unintended consequences for Smith's invisible hand, or about negative (alternatively intentional or unintended) consequences for negative externalities.[36]

As the dynamics of development follow different levels of speed, imbalances amongst local systems can generate, as Myrdal[37] emphasised, effects of attraction and diffusion with respect, for instance, to human and capital resources, trade, or social relations. Developed localities usually exert their power of attraction with respect to the resources of less dynamic

centres, whilst diffusion occurs from the strongest locality towards neighbouring systems when the push for expansion is more powerful than the attraction coming from the strongest locality. Each change in any of the two directions (attraction or diffusion) generates a cumulative movement, which will be ascending or descending depending on its causal connection with positive or negative collective effects. Adoption of a long-term perspective led Myrdal to the conclusion that a system does not move towards an equilibrium of forces but - through a process of circular and cumulative causation that follows one initial effect - the system tends to incrementally depart from equilibrium. In the long run, complementary effects - and not opposite effects - tend to accelerate changes within the system. By virtue of this process of cumulative causation, the concept of so-called 'free markets'[38] would lead to the creation of regional imbalances, rather than being the mechanism to diffuse development.

The organisation of production, as planned by firms, influences economic systems at different levels and can generate those initial effects that Myrdal identified as the spark of circular cumulative causation. Systems of production are continuously redefined by advances in learning and innovation, as well as by the interaction amongst large transnational corporations, medium and small sized firms, and institutions. At the international level, in particular, production decisions are mainly shaped by large transnational corporations. In so doing, the strategy of transnationals affects both economic actors and local systems.

The patterns of interaction that develop amongst firms located in different economic systems involve complementary functions and abilities or, compatibly with our denotation, capital complementarities. The principle according to which functions in transnational production are distributed can, nonetheless, discriminate local systems with respect to their ability to develop. The scenario of international production is compatible with a structure that divides actors into 'superior' and 'subordinate'. As Hymer[39] emphasised, in a world economy dominated by large transnational firms, the

international division of labour is divided into three levels, from the top which is concerned with strategic planning, to the lowest, which is concerned with day-to-day events. This view advances very important welfare implications in terms of 'income, status, authority and consumption patterns'. While skilled workers and superior communication systems are a prerogative of the major centres hosting the first levels of activities, an unskilled labour force characterises those activities related solely to the presence of raw materials, markets and manpower. This means that there are places where, although activities are complementary to those of other localities, the level of knowledge involved in production is not high enough to raise actors out of subordination.[40]

This conclusion would be incomplete if we would not consider a further element. Knowledge, we have argued, can be considered a specific means of production, which takes the form either of physical, human or relational capital. The improvement of machine processes (physical capital), or the level of education of the labour force (human capital) may be necessary conditions to generate diffused economic development. However, they cannot alone be sufficient conditions to retain the power to influence strategic decisions in production. Power is, in fact, the ability to determine broad policies and objectives with or without the consensus of others.

Analytically, developing on Weber's basic definition of power,[41] we identify economic power as the ability of an actor or group of actors to bring about desired consequences even (but not necessarily) despite the willingness and resistance of others. Such ability is not static. What makes it dynamic is, on the one side, firms' actions, which can - over time - impact on institutional change. Institutional change in turn can have an impact on firms' strategies, opportunities and actions and, therefore on the capability of firms to affect the distribution of power collectively.

Those who retain this ability are not those who retain knowledge alone, but those who retain knowledge with strategic relevance and are able to take advantage of it (i.e. to have voice in production). Therefore, control over

production can be located where control over knowledge (i.e. capital) assets is concentrated, under the condition that those who retain knowledge can also have strategic decision making power with respect to issues of production. This may or may not coincide with a concentration of physical, human, or social capital, each one taken alone.

Whilst Hymer's uneven development is caused by factors that are external to localities, other contributions emphasise endogenous resources and capabilities as the main determinants of development. As regards individual actors, for instance, differences in the learning capacity imply the existence of organisations where knowledge acquisition or production is poorer.[42] Hamel, for example, has noticed that in strategic alliances - depending on the degree of access and internalisation of new knowledge that partners can achieve by working together - there may be a relevant 'reapportionment of skills' between partners. This uneven learning changes the relative power of actors within the alliance. Therefore, the distribution of power within economies may also be partly linked to the endogenously determined capabilities of individuals and organisations.

The same principle can be observed also within localities. Systems that are better able than others to recognise opportunities and learn from experience will gain an advantage with respect to less dynamic and receptive localities.

It is very important to notice, however, that the two causal dimensions (exogenous and endogenous) may be subject to a vicious circle. Localities with poor concentration of capital and, presumably, decision-making centres, have less power than localities with superior resources. At the same time, this relative lack of power hinders the possibilities of weak localities to be evenly included in the dynamics of knowledge diffusion and creation. If such a circle is activated, power distribution becomes a very influential element that underlies both the exogenous and endogenous determinants of uneven development.

An interesting phenomenon is the so-called telematic democracy based on the diffusion of the world wide web. In particular, as far as trade and

production are concerned, it is argued that markets are 'free' by virtue of the potential for communication that has been opened by the internet. Whilst this process is getting more and more structured and diffused in western countries, there are localities that are excluded from such a radical change in technologies (Figure 1). With respect to countries that are below the poverty line, for instance, the technological gap is getting larger, and the speed at which the gap increases is higher than before. The top of the 'marching column'[43] has been able to activate a virtuous circle around the accumulation of capital and the diffusion of knowledge (Figure 2). On the contrary, where there is a lack of development, in terms of capital accumulation the speed at which elsewhere information circulates and knowledge is created amplifies the gap between richer and poorer localities, thus activating a vicious spiral that jeopardises the development of capital and knowledge in poor localities. As an example we plot in Figure 1 the diffusion of personal computers for selected countries.

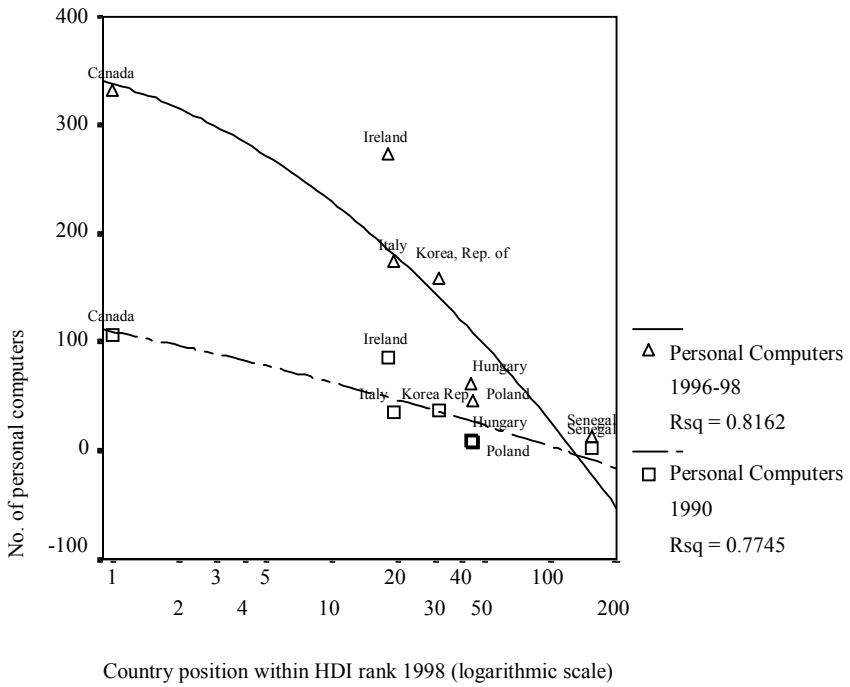

Figure 1: Technological Gap between selected developed and less developed countries. Number of personal computers per 1000 people in 1990 and 1996--98.

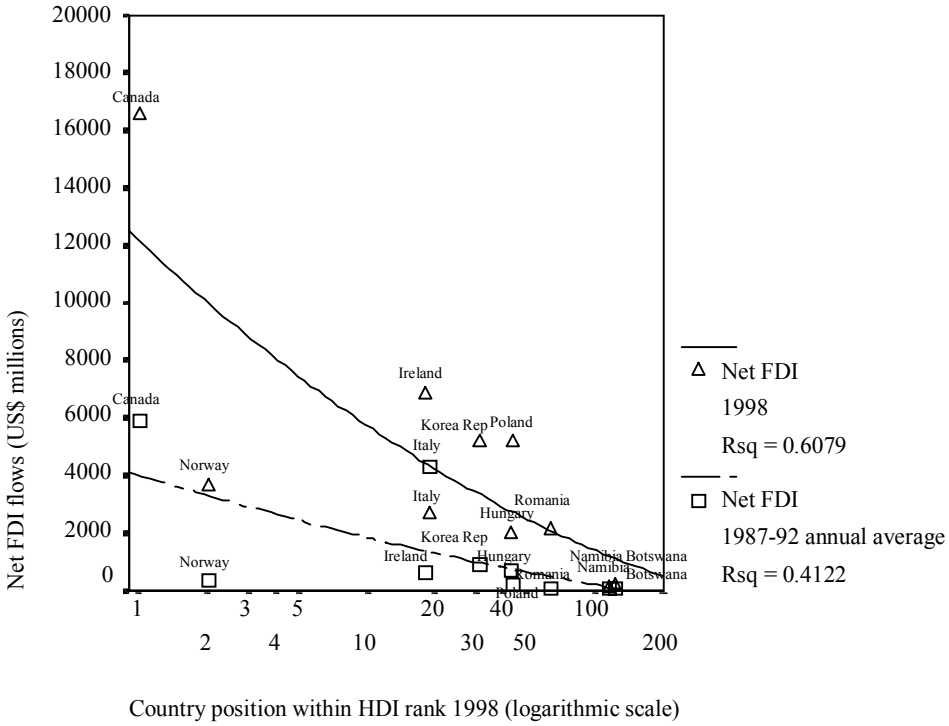

Figure 2: The Capital Accumulation Gap: net foreign direct investment flows for selected developed and less developed countries in 1987--92 and 1998
Source: authors elaboration on UNDP data (UNDP, 2000)

A comparison between the situation in 1990 and 1996-98 shows that the technological gap between developed and less developed countries is getting larger. Furthermore, if we associate considerations on technology with capital accumulation using net FDI flows as a proxy of a country's increase in assets (Figure 2), we observe that progressively capital tends to concentrate where there is the knowledge to use it effectively. Capital concentrates in developed countries or in newly industrialised countries (mainly in the Asian region).[44] Especially in this example, the HDI (Human Development Index)[45] rank is substantially increasing its power in explaining the difference between countries.

6 CONCLUSIONS

In this paper we have provided some theoretical insights on the problem of the impact of the organisation of production on local development. Our main finding is that production activities impact on local systems by

activating either virtuous or vicious cycles in capital accumulation, where by capital we refer to the knowledge incorporated into technologies, human resources, and relationships. The value of production, in particular, is mutually defined by the knowledge that the process of production injects into the final products, by the level of standardisation of technologies reached in the industry, and by the market perception of the value of goods.

Production decisions are mainly taken by firms and, at the international level, by transnational corporations. The division of labour across firms and localities, in particular, has been accentuated by the increasing complexity of knowledge contents in production. Complementary activities are compatible, however, with a hierarchy of functions across localities that is characterised by different levels of knowledge contents and by different levels of economic power.

Therefore, the division of labour amongst firms and localities is mainly affected by the strategies of firms, which decide according to their own objectives. At the international level, taking into account a number of factors such as the cost of labour and the knowledge required by different activities, the organization of production affects the functions in which a locality specialises or, if the locality has already its own production identity, it will further enhance local specialisation.

The evolution of localised knowledge is strongly influenced by the characteristics of its production activities. In particular, the resources already embedded in the locality and production decisions of firms exert a reciprocal influence on each other. On the one side local systems offer specific knowledge resources that may attract production activities. On the other side firms localise their activities also on the basis of the advantages offered by a locality. This mutual influence generates a process of cumulative and circular causation between the accumulation of resources and the production functions localised on a territory. Those localities that are typified by labour intensive activities and low capital (knowledge) contents will attract activities that require low levels of knowledge. The

resources of a local system - in terms of the knowledge embedded in technologies, learning, and relationships - will not expand. Oppositely, those territories where specific knowledge has been cumulating over time will attract firms because of their knowledge resources. If the knowledge of firms is spread outside in the territory, the high knowledge content of production activities located within the system will further improve the amount of technological, human and relational resources of the territory. Processes of cumulative causation of this sort, as Myrdal maintained, hamper convergence amongst regions and localities, enlarging the gap between dynamic localities where capital has been consolidated over time and localities where resources have remained poor. Where capital attracts new capital virtuous cumulative processes will promote further accumulation, whilst where resources are poor and knowledge does not spread outside firms, the dynamics of technological change and learning will be jeopardised by firms' strategic choices and by the power of attraction of more advanced areas.

The perspective we have taken on power, in particular, helps us to enrich our understanding of the role of knowledge in production. Once we introduce power, knowledge *per se* is not anymore sufficient to follow the mutating structure of decision-makers in production. In this sense, for instance, it is not technology that gives economic power to firms, but firms' ability to associate to such technology the power of exerting their 'voice' effectively, for instance when working in partnership with other firms. Now, this conclusion links our two main points. On the one side, local development depends on the knowledge content of activities undertaken with the participation of local economic actors. The possibility to take advantage of knowledge, however, depends, at the firm level, on the opportunities that firms have to strategically effect production decisions. At the local level, the knowledge accumulated under the form of human, physical and relational capital can activate the development of further knowledge, which can provide local institutions more power to shape the

direction of development consistently with the objectives expressed at the local level. The relationship between production decisions and firms is of course partial, as most advanced systems can rely on the active involvement of local institutions in strategic decision making. Local institutions are key economic actors, as their involvement in strategic decision-making gives voice to local objectives, thus allowing a locality to decide which direction local development should take. From this perspective, the localisation of strategic decision-making is crucial, as it impacts on the capability of a locality to be involved in its own development. If the division of labour occurs across localities, the direction undertaken by territories in positioning themselves into this system strongly impacts on capital accumulation. Therefore, if we want to talk about local development, the consequences of such positioning must meet collectively shared objectives. This may or may not coincide with the organisation of production decided by firms.

NOTES

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1. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*. Italian translation: *La ricchezza delle nazioni* (Newton, 1995 [1776]), Bk IV, ch. II, p. 391.

   See also Poma on this point and for further treatment of the concept of knowledge in Hayek, Keynes and Marshall: Lucio Poma, (2000) 'La pro-ducción de conocimiento. Nuevas dinámicas competitivas para el territorio', in: F. Boscherini and L. Poma (Eds) *Territorio, conocimiento y competitividad de las empresas. El rol de las institutiones en el espacio global* (Miño and Davila, 2000), pp. 381-96.
2. With respect to economic growth, for instance, Max Weber emphasised the importance of religious ethics over consumption, whilst Duesenberry stressed the importance of imitation of externally consolidated consumer habits (the so-called

'demonstration effect'). Max Weber, *Die Protestantische Ethik und der Geist des Kapitalismus* (Mohr, 1905). English translation: *The Protestant Ethic and the Spirit of Capitalism* (Scribner's Press, 1958). J. S. Duesenberry, *Income, Saving and the Theory of Consumer Behavior* (Harvard University Press, 1949). These contributions gave important instruments for the interpretation of phenomena such as the lack of capital accumulation, under-investment, and to the related obstacles that countries with problems such as those mentioned above have to face to increase their production capacity. See also: Ragnar Nurkse, *Problems of Capital Formation in Underdeveloped Countries* (Basil Blackwell, 1953). Italian translation: *La formazione del capitale nei paesi sottosviluppati* (Einaudi, 1965), pp. 7-30 and 70-92.

3. Which could, for instance, be economies of scale and different forms of externalities. But the study of these factors, although important, is not amongst the aims of this work.
4. On cognitive approaches see: Friedrich A. Hayek, *The Sensory Order. An Inquiry into the Foundations of Theoretical Psychology* (Routledge and Kegan Paul, 1952); and Herbert Simon, *The Science of the Artificial* (MIT Press, 1969).
5. Edith T. Penrose, *The Growth of the Firm* (Basil Blackwell, 1959), pp. 66-7.
6. Brian J. Loasby, 'Explaining Firms', Working Paper Series (RSC No. 99/8), Copenhagen Business School, Copenhagen, pp. 1-16.
7. Salvatore Rizzello, *L'economia della mente* (Laterza, 1997).
8. Giovanni Dosi, David J. Teece and Sidney G. Winter, 'Towards a Theory of Corporate Coherence: Preliminary remarks', in: G. Dosi *et al* (Eds), *Technology and Enterprise in a Historical Perspective* (Clarendon Press, 1992), pp. 185-211.
9. Richard R. Nelson and Sidney G. Winter, *An Evolutionary Theory of Economic Change* (Harvard University Press, 1982).
10. Rizzello, *L'economia della mente*, p. 185.
11. Loasby, 'Explaining Firms', p. 11.
12. Alfred Marshall, *Principles of Economics* (Macmillan, 1961), Bk IV, ch. X.
13. Smith makes a distinction between the natural value of goods and their market value. Whilst the natural value reflects exactly the value of the product (the cost of producing and distributing the good), the market price may equal, be lower or higher with respect to the natural value, and it is determined by supply and demand conditions. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Bk I, ch. VII, p. 101.

    In this work, by natural value we consider the cost of producing and distributing a product as the cost which is given by the knowledge contents of production and

distribution activities, although the focus is mainly on production rather than distribution.

14. On the relationship between investment and co-ordination see: George B. Richardson, *Information and Investment* (Oxford University Press, 1960).

15. There can be much labour in one hour spent to undertake a difficult work than in two hours spent to perform an easy task, or in a job which requires ten years of learning before being able to undertake it, rather than in a common and generic activity. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Bk I, ch. V, p. 83.

16. Howard Baetjer, 'Capital as Embodied Knowledge: Some Implications for the Theory of Economic Growth', *Review of Austrian Economics*, Vol. 13, No. 2 (2000), pp. 147-174.

17. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Bk I, ch. I, p. 70.

18. Karl Polanyi, *The Livelihood of Man* (Academic Press, 1977). Italian translation: *La sussitenza dell'uomo* (Einaudi, 1983), p. 58.

19. Carl Menger, *Grundsätze der Volkswirtschaftslehre* (Wilhelm Braumüller, 1871). Italian translation: *Principi di economia politica* (UTET, 1976), ch. I.

20. In Polanyi, the notion of human needs is used within the idea of 'substantial economy' as opposed to 'market economy'. In the former, there is a significant integration between human beings, nature, technology, and social organisation. In this perspective the idea of human needs is not limited to the needs satisfied through the market, but it refers to goods that are necessary to non-isolated individuals in order to survive and to have a good life. Human needs are not unlimited, and no need is considered natural except that for preservation: a deeper view with respect to that of consumer needs.

21. Friedrich A. Hayek, 'The Use of Knowledge in Society' *The American Economic Review*, Vol. 35, No. 4 (1945), pp. 519-30.

22. By considering only price information, for instance, markets could also operate an adverse selection with respect to products of higher quality. This happens, for instance, when consumers are not willing to pay for an improvement of accepted standards, as it has been for biological products at their earlier stages, when environmental consciousness was not vastly diffused within the society.

23. Gilberto Antonelli, 'Problemi e strumenti di analisi del cambiamento tecnologico', in: G. Antonelli (Ed), *Innovazioni tecnologiche e struttura produttiva: la posizione dell'Italia* (Il Mulino, 1984), p. 7.

24. However, as Cristiano Antonelli has recently argued, firms operate in heterogeneous markets and are characterised by a substantial difference in the *use* they make of technologies and organisation. Cristiano Antonelli, *The Economics of Localized Technological Change and Industrial Dynamics* (Kluwer Academic Publishers, 1995), ch. 12.

25. Nathan Rosenberg, *Perspectives on Technology* (Cambridge University Press, 1976).

26. Capital accumulation can, nevertheless, be hampered by other factors that are typically related to underdevelopment. We have already mentioned the demonstration effect, which makes (differently from the Keynesian perspective) consumption to grow when incomes augment. But we could also refer to capital mobility, for which capital flows from less developed regions to localities where it can be invested in more profitable activities.

27. Lucio Poma and Silvia Sacchetti, 'Knowledge life cycles inside local economic systems', unpublished Working Paper, Department of Economics, University of Ferrara, Ferrara, 2003, pp. 1-20.

28. David Ricardo, *On the Principles of Political Economy and Taxation* (John Murray, 1819). Italian translation: *Principi di economia politica e dell'imposta* (UTET, 1986), ch. XXXI.

29. Karl Marx, *Das Kapital. Kritik der Politischen Oekonomie*. Italian translation: *Il Capitale* (Newton, 1996 [1867]) Bk I, ch. XIII, p. 288.

30. Piero Sraffa, *Production of Commodities by Means of Commodities. Prelude to a Critique of Economic Theory* (Cambridge University Press, 1960). Italian translation: *Produzione di merci a mezzo di merci. Premessa a una critica della teoria economica* (Einaudi, 1960), 7th edition, ch. X, pp. 80-2.

31. Friedrich A. Hayek, *Profits, Interest and Investment* (Routledge, 1939), pp. 83-139.

32. The rise of *governance* both in applied and theoretical literature shows that in contemporary debate participation in governing localities has become a social objective. In particular, special attention has been given to the notion of *multi-level governance* 'as a co-ordinating instrument in institutional systems where hierarchical command and control mechanisms have been relaxed or abolished.' Gerry Stoker, 'The Challenge of Governance'. paper presented to the Forlì conference *Governance and Institutions: Open Economy versus Bounded Contexts*, Forlì, March 2001, p. 2. Multi-level governance implies that local government offers itself as a partner within a wider context of regional, national and international interdependencies. On the concept of multi-level governance see

also Roderick A.W. Rhodes, *Understanding Governance. Policy Networks, Governance, Reflexivity and Accountability* (Open University Press, 1997).

33. Roger Sugden and James R. Wilson, 'Development in the Shadow of the Consensus: A Strategic Decision-Making Approach', *Contributions to Political Economy*, (2002, forthcoming).

34. As far as production is concerned, one necessary condition for development is to establish common resources that may enable local participation in strategic decisions. To assess participation in a locality we look at the degree to which different actors (for example, public agencies, unions, and other interest group associations) interact on a common ground. Such interaction may lead to a collective strategy with which the objectives of different actors must be consistent for the strategy to be effective. At a public level, the design of a common strategy, that yet remains submitted to the political willingness to reach it, requires communication. We interpret communication amongst actors as one fundamental resource for participation in strategic decision-making. In particular, it has been maintained that - at the political level - the more communication can be institutionalised in some form of stable roundtables for deliberation, the more participation of actors can be effective in strategy-making. This point has been further developed in: Silvia Sacchetti and Roger Sugden 'Knowledge Distribution, Linkages and Power in the Economy. A Perspective on Development', paper presented at the *EUNIP 5th annual Conference*, Vienna, December 2001, pp. 1-27. Available on line: http://www.eunip.com.

35. Knowledge assumes here another significance with respect to productive knowledge. It is seen as the perception and recognition of the impact that individual action exerts at the collective level. When this kind of knowledge is institutionalised at the collective level (for instance, through norms and rules which govern economic interactions), local institutions can be better able to isolate behavioural patterns that are not consistent with local development policies and feedback their decisions, thus regulating individual actions that discord with local aims and objectives.

36. Jon Elster, *Nuts and Bolts for the Social Sciences* (Cambridge University Press, 1989), pp. 91-100.

37. Gunnar Myrdal, *Economic Theory and Under-Developed Regions* (Duckworth, 1957). Italian translation: *Teoria Economica e Paesi Sottosviluppati* (Feltrinelli, 1974), pp. 21-3 and 39-42.

38. Neo-classic economic theory has addressed economic development from a perspective based on the concept of stable equilibrium. Not least, this powerful

concept has been at the basis of the theory of so-called 'free markets', where markets have been considered the most effective mechanisms that lead to stable equilibria. In this context the notion of stable equilibrium has been used as an ideal reference point towards which economic systems should be oriented and, as a consequence, equilibrium has been used as a measure to formulate value judgements about the development of economic systems. One clear problem however remains. Stable equilibrium theories have not succeeded in explaining differences between regions and nations in terms of economic development. Critiques to the concept of free markets are based on the idea that power is a constituent element of economies and that economic actors do not have equal power when interacting on the market. Silvia Sacchetti and Roger Sugden, 'The Governance of Networks and Economic Power: The Nature and Impact of Subcontracting Networks', *Journal of Economic Surveys*, (2003, forthcoming).

39. Stephen H. Hymer, 'The multinational corporation and the law of uneven development', in: J. N. Bagwaty (Ed), *Economics and World Order from the 1970s to the 1990s* (Colier-Macmillan, 1972), pp. 113-40.

40. Specialisation as a means to organise production has been explained by neoclassical economics in terms of efficiency. However – expanding on Smith's *Wealth of Nations* – Marglin has emphasised that the choice of the division of labour lies 'between the workman whose span of control is wide enough that he sees how each operation fits into the whole and the workman confined to a small number of repetitive tasks. It would be surprising indeed if the workman's propensity to invent has not been diminished by the extreme specialization that characterises the capitalist division of labor'. Stephen Marglin, 'What do bosses do? The Origins and Functions of Hierarchy in Capitalist Production', *Review of Radical Political Economics*, Vol. 6, No. 2 (1974), pp. 60-112. These considerations, we argue, can be applied when looking at the division of labour across localities.

41. Max Weber, *Wirtschaft und Gesellschaft* (Mohr, 1922). English translation: *Economy and Society* (Bedminster Press, 1968).

42. See: Gary Hamel, 'Competition for Competence and Inter-Partner Learning within International Strategic Alliances', *Strategic Management Journal*, Vol. 12, special issue (1991), pp. 83-103; and Herbert A. Simon, 'The Many Shapes of Knowledge', *Revue d'Economie Industrielle*, 2nd semester, No. 88 (1999), pp. 23-41.

43. Borrowing from Tocqueville, Daniel Bell presented the process of growth as a 'marching column'. The disposition of the column reflects income distribution,

which does not change significantly over time, while the column - as a whole - advances. Whilst this advancement occurs, the bottom of the column reaches and overcomes the point where the top was at the time before. However, as the whole column is moving, the bottom could never be where the top is, unless it breaks the rank and runs to the front. Daniel Bell, *The Coming of the Post-Industrial Society* (Heinemann, 1974); Fred Hirsch, *Social Limits to Growth* (Harvard University Press, 1976). Italian Translation: *I limiti sociali allo sviluppo* (Bompiani, 1991), p. 176.

44. The World Bank 1996 report states that 30 per cent of GDP in developing countries is produced in eight countries that are mainly Asian. This share of GDP generated two thirds of overall FDI flows in 1990-93. Conversely, over the past decade ratios of FDI to GDP fell in most of the other world regions (mainly Sub-Saharan Africa). World Bank, *World Development Report 1996: From Plan to Market* (Oxford University Press, 1996), p. 22.

45. The HDI is based on three indicators: life expectancy at birth; adult literacy rate and combined primary, secondary and tertiary gross enrolment ratio, GDP per capita (adjusted PPP US $). Human Development Index for high human development countries is 0.8 and above, for medium human development countries is between 0.5 and 0.799, for low human development countries is below 0.5. UNDP, *Human Development Report 2000* (Oxford University Press, 2000). Italian translation: *Rapporto 2000 su Lo Sviluppo Umano* (Rosenberg and Sellier, 2000), pp. 302-3.