

# Introduction

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Multinationals play a fundamental role in innovation and productivity growth. Indeed, 98 per cent of the top 700 R&D spenders are multinational firms (MNFs) and account for more than two-thirds (69 per cent) of the world's business R&D (DTI 2004). A few of these companies (such as Ford Motor, Daimler Chrysler and Siemens) individually invest in R&D more than the overall expenditure of some developed countries, such as Spain, Switzerland or Israel. Moreover, a growing share of innovative activities is no longer concentrated in the home country, but is carried out by MNFs on a global scale. This can be illustrated by the fact that the share of national R&D held by foreign firms in a sample of 30 (developed and developing) countries rose from 10.3 per cent in 1993 to 15.9 per cent in 2002, reaching values well above 50 per cent in Ireland, Hungary and Singapore (UNCTAD 2005).

These data highlight a specific, albeit crucial, aspect of the more general process of globalisation, which implies a growing interdependence of firms, industries, and economic systems. As part of this process, MNFs can play a key role as vehicles for the international transfer and creation of technology or, more generally, as institutions bridging different innovation systems. However, MNFs also have relevant degrees of market power, can crowd out domestic activities in host countries and appropriate rents, often at the expenses of local firms. Until the early 1980s, a large part of the literature has viewed the MNFs as 'quasi-colonial' institutions, exploiting their technological advantages abroad. This perspective has led to scepticism over the activities of MNFs and has, for a long time, provided a rationale for policies aimed at discouraging inward foreign direct investments (FDIs). Over the last two decades this view has gradually changed and the literature has stressed the potential benefits of MNFs. The attitude of policy makers has also evolved towards a more benign approach to incoming multinationals, whose activities in host countries are now seen as directly beneficial and as a potential source of externalities. To illustrate this changing attitude, one might simply consider that 94 per cent of 2,156 cases in which host governments modified their policy of FDI selection and control in 1991–2004 resulted in being more favourable to foreign investors, including subsidies and more liberal admission rules (UNCTAD 2005). It remains that empirical evidence on the actual impact of multinationals on host economies is

still mixed and there seems to be a growing consensus among scholars that substantial diversities exist in the extent to which different MNFs contribute to the global generation and transfer of innovation. This volume adopts this latter perspective. It focuses on how and why firms differ in internationalisation, innovation and productivity, and examines the implications of this diversity within industries. In particular, it shows that the economic impact of multinationals depends largely on intra-industry heterogeneity.

Our line of argument is organised into three analytical steps. The first step will be to focus on the way in which MNFs organise their innovative activities across national borders. We first challenge the view of MNFs as 'quasi-colonial' institutions exploiting foreign markets by way of technological advantages accumulated in their home bases. We shall highlight that there are important technological and institutional factors that induce multinationals to combine the exploitation of their proprietary advantages with an increasing access to local sources of knowledge. We shall argue that the increasing importance of asset seeking activities is leading firms to organise their innovative activities according to what we identify as a *double network* structure. Multinationals develop both internal webs interconnecting the innovative activities of a growing number of affiliates located in different countries; and external networks through which these affiliates set up linkages with foreign firms and institutions to further exploit their knowledge assets and gain access to local resources. To the extent that multinationals increase their embeddedness in different local contexts by means of both internal and external networks, they accentuate their natural role as *bridging institutions*: MNFs increasingly connect geographically dispersed innovation systems, being conditioned by, and contributing to, their characteristics and evolution. Overall, this evolution of firms' innovative activities on a global scale has the important implication that multinationals will increasingly differ in terms of the intensity and variety of their technological advantages.

This leads us to the second step of our study, that is heterogeneity in internationalisation, innovation and productivity. We build on the emerging literature on heterogeneity, international trade and FDIs to show, first, that firms do differ in terms of both innovation and productivity according to their degree of involvement in international activities. This reflects a combination of self-selection mechanisms, implying that more efficient and innovative firms will be more capable of competing in foreign markets; and of knowledge accumulation processes due to the fact that international involvement allows firms to access local sources of competitive advantages. Second, we highlight that heterogeneity can also be observed *across multinationals*, according to the number, strength and variety of economic and

innovative systems they connect, and to the way these links are organised. As a consequence, MNFs differ from one another in terms of their productivity and innovative performances. Third, there will be heterogeneity *within multinationals*, reflecting the uneven distribution of advantages among units belonging to MNFs. Tension exists between international dispersion and concentration of innovative activities, which *inter alia* determine a variety of technological profiles according to the position of units in multinational organisations.

The study of intra-industry heterogeneity paves the way to the third step of our analysis, namely the economic impact of multinationals. Here the idea is that it is not enough that multinationals enter or increase their presence in a given economy to generate spillovers. It is not even only a matter of how they are 'motivated' towards asset-seeking activities as revealed, for instance, by the nature and distribution of their advantages relative to local firms. We submit that heterogeneity of both foreign and domestic firms needs to be examined in detail in order to capture the economic impact of multinationals. In other words, the key issue is that *not every* foreign firm is a good source of externality and *not every* domestic firm is equally well placed to benefit from MNFs. From this perspective we explore the slippery area of horizontal spillovers which have attracted considerable empirical work, but where recent studies have found weak and often contradictory evidence. First, we submit that foreign firms are likely to have a different impact according to their own technological profiles and to their degree of embeddedness in local contexts. Second, their impact also depends on the characteristics of domestic firms, in terms of absorptive capacity and ability to challenge foreign firms in national and foreign markets. Exploiting the results from the previous analytical step, we argue that the degree of international involvement can be a good proxy for such conditions to hold. Third, we compare spillovers due to the expansion of foreign firms in host countries, to spillovers from the expansion of domestic owned multinationals in their home countries. By so doing we are able to explore the implications of heterogeneity across MNFs, given that foreign firms and domestic owned multinationals belong to different groups. By the same token, the implications of heterogeneity within MNFs can also be captured, given that foreign firms are by definition affiliates of a multinational based elsewhere, while firms belonging to a domestic owned multinational group may either be parent companies or national affiliates.

The book is organised into three parts according to the three steps briefly described above. Part I (Chapters 1 and 2) develops a general framework for the analysis of the links between innovation and international production. Chapter 1 discusses the widely accepted distinction between asset exploiting and asset seeking FDIs, and introduces the view of MNFs as

a double network. This allows us to draw implications for the international organisation of innovative activities and for the analysis of intra-industry heterogeneity. Chapter 2 reviews the empirical literature on the evolution of MNFs towards a double network structure. In particular, using a sample of the world's largest MNFs in the chemical and electronics industries, we find that the characteristics of the internal network of multinationals are associated with the propensity to engage in external linkages, such as mergers and acquisitions, joint ventures and strategic alliances.

Part II (Chapters 3 and 4) goes deep into the analysis of how firms differ in innovation, productivity and internationalisation. Chapter 3 focuses on different approaches to the analysis of the relationship between international involvement and intra-industry heterogeneity in terms of innovation and productivity. Chapter 4 discusses the less explored issues of heterogeneity across and within multinationals. Both chapters provide sound empirical evidence drawn from a large sample of Italian manufacturing firms that supports the idea that differences in international activities are related to significant heterogeneity in innovation and productivity. In Chapter 3 we find that firms with a high involvement in foreign activities also exhibit better economic and innovative performances. In particular, the companies with the highest international involvement, namely firms with production activities abroad, are characterised by both the highest productivity premiums and the highest R&D efforts and innovative performances. By contrast, Italian multinationals with a lower commitment to foreign markets, i.e. with only non-production activities abroad (such as subsidiaries involved in distribution activities), do show levels of productivity that stand between those of multinationals with production activities abroad and those of mere exporters, but they do not innovate more than the latter. In Chapter 4 we show that while foreign firms perform better than domestic firms as a whole, this is not the case if domestic-owned multinationals are distinguished from uninationals firms. In particular, we find that parent companies of domestically owned multinationals exhibit higher R&D, innovation and productivity, as well as a higher propensity to set up technological alliances with local counterparts than affiliates of foreign multinationals. However, systems of origin seem to play a role. In particular, US-owned firms outperform affiliates of multinationals from other countries and reach productivity levels similar to those of Italian multinationals.

Part III (Chapters 5 and 6) develops a thorough analysis of the impact of MNFs on host economies in the presence of heterogeneous (foreign and domestic) firms. Chapter 5 reviews the literature on MNFs and productivity spillovers, discusses some methodological issues, and highlights useful insights from several empirical studies on this topic. The chapter also recalls the main results of our comparative analysis of productivity spillovers from

foreign presence in three EU countries (France, Italy and Spain). We show that the effects of foreign presence on the productivity of domestic firms differ across countries and highlight that technology gaps between foreign and domestic firms do help explain these differences. These results are used as a first move in analysing the role of heterogeneity of foreign and domestic firms as an important predictor of spillover effects. Chapter 6 draws together the ideas developed in previous chapters and discusses the implications of heterogeneity of foreign and domestic firms for the analysis of spillovers. Original evidence is provided in this chapter, too. In particular, we find that on average foreign multinationals do not determine any significant external effect on domestic-owned firms in Italy. However, positive spillovers are associated with the activity of foreign affiliates investing more intensively in R&D, and with those which have been established in the country for a longer period of time. Furthermore, exporters seem to benefit more from foreign multinationals than non-internationalised firms and domestic multinationals, while non-internationalised firms appear to benefit from the expansion of domestic multinationals. This result is consistent with the idea that policies aimed at attracting foreign multinationals can be complemented with measures supporting the growth of domestic multinationals.

Besides the analytical contributions to the ongoing literature on the role of MNFs in innovation and productivity growth, we believe that this volume offers at least three further motives of interests, related to some of the methodological choices that we have made. First, we try to bridge different theoretical approaches and streams of research, drawing from international trade, international business, industrial organisation and economics of innovation literature. While boundaries between disciplines matter, we also believe in the virtues of cross-fertilisation. Moreover, there are clear advantages from a more comprehensive analysis of the multifaceted relationship between innovation and international production.

Second, we integrate the survey of empirical evidence and illustrative case studies from previous research, with systematic econometric analysis based on large datasets. In particular, we use a sample of the largest European, US and Japanese multinationals in electronics and chemical industries, which enables us to focus on the role of MNFs internal network in explaining their pattern of technological collaborations and other forms of external linkages. Furthermore, we exploit an extensive dataset on ownership structure, multinational activities and performances of European firms. The dataset, named Elios (European Linkages, Internationalisation and Ownership Structure), is obtained at the intersection of two commercial databases, Dun and Bradstreet's *Who Owns Whom*, and Bureau Van Dijk's *Amadeus*, and collects firm level data for selected EU countries over the 1990s (see

Appendix). This data source has been further integrated with firm-level information obtained from Eurostat's Community Innovation Survey on the innovatory activities of firms in Italy, which allows us to evaluate the links between international production and technological change in a more direct and comprehensive way. This gives us the possibility of exploring different aspects of the relation between internationalisation, innovation and productivity.

Finally, while our work is mainly directed to an audience of researchers, graduate students and academics, individual chapters will be of interest for undergraduate students who could utilise it as further reading, in combination with traditional textbooks of international business, international economics, industrial economics and economics and management of innovation. The 'modular use' of this volume is also facilitated by the fact that each chapter, while strongly interconnected to the others and justified as a part of a wider analytical framework, is self-contained. This means that the topic being treated will be framed in the literature, methodological issues will be addressed and recalled when needed, and results discussed in clear terms, avoiding excessively technical jargon. These characteristics make the book useful also for practitioners, who might be particularly interested in the strategic and organisational implications of the analysis, especially in Chapters 1, 4 and 6. Policy makers will be particularly interested in the analysis of firm heterogeneity and of the effects of multinational activities (Parts II and III).