Multinational Firms, Innovation and Productivity

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It has long been argued that multinational enterprises (MNEs) outperform their rivals that are less internationalized (Morck and Yeung, 1991). More recently, performance measures on internalization, innovation, technology and productivity show this (Helpman *et al.* 2004). Based on such findings, governments around the world have come to support and entice such firms to invest in their countries in the expectation that domestic industries will benefit from the creation and dissemination of superior knowledge (Mudambi, 1998). However, much less is known about how and why firms differ across various performance indicators and the implications of such diversity on the economies in which they operate.

Castellani and Zanfei aim to fill this gap. This book represents the authors' long standing research interests, in explaining the heterogeneous performance capabilities and effects of MNEs. They offer a set of credible theoretical explanations, backed up by empirical evidence on this topical issue. Their arguments are set out in three parts. Part I (Chapters 1 and 2) describes the global organization and behavior of MNEs innovative activities as a *double network* structure, consisting of an internal and external network. Chapter 1 begins by developing this *double network* framework, bringing together different strands of literature on the theory of the MNE. It is argued that MNEs are increasingly organizing their innovative activity through a web of affiliates, according the efficient exploitation of their pre-existing proprietary assets (internal network). This internal network is combined with a drive to develop linkages with local or host firms and institutions (external network). This is crucial in the effort to absorb complementary local knowledge sources which in turn leads to the better exploitation of their knowledge assets. It is the realization that motives of asset exploiting FDI (implicit in the internal network) and asset seeking FDI (implicit in the external network) are indeed complementing and reinforcing the innovative efforts of MNEs (Cantwell and Mudambi, 2005). They see the innovative development of MNEs as an evolutionary process whereby the interdependence of units internal and external to the firm provides channels for the creation and transfer of technology at home and abroad. According to the authors, this makes MNEs "bridging institutions that increasingly connect geographically dispersed innovation systems, being conditioned by, and contributing to their characteristics and evolution" (p.37). Thus, this work summarizes and extends previous work by the authors (e.g., Castellani and Zanfei, 2002).

Chapter 2 reviews the existing evidence on the various aspects consistent with this framework. This is drawn from five different strands of empirical research including the international dispersion of innovative activity and that concerning local embeddedness and cohesion in host economies. Evidence on the complementarity between different types of internal and external networks is shown with reference to 94 firms in the electronics and chemical industries across Europe, North America and Japan. The overall conclusion is that innovative behavior and performance will significantly differ according to the characteristics of the MNE's internal and external networks. It is through their double network explanation that the reader can get a glimpse of how and why MNEs differ in their performance from one another within the same industries. The author's argue that the analysis of MNE diversity has important implications for studying the impact it might have on host economies.

Having provided an insight into how MNEs organize their innovative activity abroad, Part II (Chapters 3 and 4) takes a closer look at the interdependence between internalization, innovation and productivity. Chapter 3 reviews the vast literature ranging from the product life cycle and transaction cost theory to the theory of international production and the recent trade theory literature. According to these different streams of literature, the author's show that a firm's innovative and productivity performance is directly linked to the extent the firm is involved in international activities. They then test this hypothesis using their own data set on Italian manufacturing firms. The novelty in their work is to incorporate both productivity and innovative measures to show that for Italy, domestic and foreign MNEs are more innovative and productive than exporters which in turn outperform purely national firms. This differs from previous studies which focus on just one of the indicators. Moreover, their data allows them to distinguish between MNEs that own production facilities abroad from firms that control only non-production facilities, with the former exhibiting superior innovative and productive performance than the latter. Put simply, the more firms are internationalised, the more they need to be endowed with some intangible assets, such as superior technology or organizational skills. The greater international involvement in turn may also be associated with learning from other local firms and technology sourcing, thus further reinforcing their firm-specific advantages.

The analysis in Chapter 4 builds on and continues to focus on other aspects of intra-industry heterogeneity across MNEs and introduces a further dimension which they argue is much neglected in the literature, namely heterogeneity observed within MNEs. They distinguish between three units which compose an MNE, namely the parent company, foreign affiliates and national affiliates.

From the review of the theoretical and empirical evidence in Parts I and II, it is clear that both innovation and productivity are the key ingredients in understanding the heterogeneity in firm performance. Furthermore, the consequence of becoming more internationalized enhances the innovative and technological capabilities of MNEs contributing to the heterogeneous nature among firms. The authors draw a general public policy implication: An increasing share of foreign or domestic MNEs in the economy would provide a positive direct effect to the overall performance of the economy and more specifically to the rate of innovation and productivity growth. As the author's point out, it would be quite wrong to attribute this effect purely to foreign-owned MNEs, as the impetus can also come from domestic MNEs which may present the most dynamic group of firms in the economy. Whether the promotion of foreign investment is more beneficial to the host economy rather than supporting the indigenous expansion of domestic MNEs is the subject matter of the last part of the book.

Part III (chapters 5 and 6) develops a thorough analysis of the indirect impact of MNEs on host economies in the presence of heterogeneous firms. Chapter 5 reviews the literature on spillovers from MNEs and presents the relevant theoretical arguments and empirical findings of past and present research. Given that the empirical evidence so far is mixed and generally fails to conclusively confirm that host country firms benefit from the presence of MNEs, the discussion turns to recent empirical studies which try to find an answer for this problem. These studies advocate alternative measures of productivity and an improved specification of the spillover effect, focussing on inter-industry or vertical spillovers, analyzing the role of technology gaps between firms and the absorptive capacity of domestic firms to benefit from foreign investors.

Chapter 6 contributes to this latter stream of research by presenting evidence of intra-industry, or horizontal spillovers for a sample of Italian manufacturing firms. Their approach follows along fairly standard lines which are well developed in previous studies reviewed by the authors in Chapter 5. The standard measurement technique describes the main form of analysis in terms of a production function augmented by measures on foreign presence from which total factor productivity is estimated sector by sector. Their findings show that spillovers to the domestic sector are greater if foreign affiliates are more R&D intensive and if they have been established in Italy for a longer period of time. Moreover, the degree of international involvement, discussed in Part II, is a good proxy for a firm's absorptive capacity. For example, exporters benefit more from foreign investors than purely national firms. However, the latter benefit from the expansion of domestic MNEs in their home country. This result indicates that the expansion of domestic multinationals can be a source of spillovers for their home countries. Moreover, their spillovers accrue to different categories of local firms, as compared to those created by foreign MNEs. Their results thus suggest that domestic and foreign MNEs may play a complementary role as sources of spillovers, accruing to the benefit of purely national firms and exporters respectively. However, any spillover effects are not automatic and depend on the characteristics of both foreign affiliates and domestic firms. For example, the domestic firm's absorptive capacity in terms of appropriate human capital and sufficient R&D spending play a key role.

Overall, this book offers the reader a well-written and very comprehensive analysis on the link between innovation and internalization which leads to insights into firm heterogeneity. The authors have succeeded in synthesizing the vast body of theoretical and empirical research and given an up-to-date overview of the various issues involved. This is then complemented with their own research findings on Italian manufacturing firms from which they derive a public policy perspective, which I found most interesting. I agree with the authors that it is sensible to take a much broader view on the relationship between innovation and internalization in an effort to explain the heterogeneous nature of firms. Their novel framework sets the scene and helps their characterization and analysis in the remaining two parts. Although not part of their main analysis in Part III, it would have been worth mentioning at some point that outward FDI undertaken by domestic MNEs has the potential for spillovers to the domestic sector both theoretically and for which there is recent empirical evidence in a few studies (e.g., Bitzer and Görg, 2005; Driffield and Love, 2007).

The intended audience is likely to be academic researchers, particularly applied economists. However, graduate students interested in the transfer and diffusion of technology will find the discussion on current empirical research very helpful. The policy recommendations in Parts II and III will be particularly interesting for policy makers. The book will undoubtedly enrich the debate on the behavior and impact of MNEs.

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