This note outlines a research project on the role of MNC subsidiaries in creating and diffusing technical knowledge in late industrialising (‘catching up’) countries. It maps directly on to two of the Innovation in Enterprise Group’s research questions:

- Question 2 on the relative roles of multinational subsidiaries and indigenous firms in absorbing, developing and diffusing technologies
- Question 3 on cross-sector differences in those roles.

It should also contribute to Question 5 on policy frameworks.

**Background**

Our planned project derives from previous research, based on Argentine Innovation Survey data, in which we demonstrated that, in contrast to much recent research, FDI-related spillovers did arise during the 1990s (Marin and Bell, 2006). This occurred under specific circumstances, not simply as a consequence of general FDI-mediated technology transfer from parent companies. But it did not reflect either of two sets of circumstances that have been suggested as important in other studies: inter-industry differences in technology intensity or absorptive capability. Instead, the spillovers were strongly associated with the existence of significant knowledge-accumulation activities undertaken by local subsidiaries themselves, a relationship which has not previously been recognised or explored.

In a further stage in this research we explored the wide variability in subsidiaries’ technological activities that underlay this result. Following one direction concerned with corporate strategy, we demonstrated (Marin and Bell, 2005) how the variability was related to what we described as the ‘structural positioning’ of the subsidiaries with respect to (i) the degree of integration within parent corporations and the global economy on the one hand, and (ii) the degree of integration of economic/business functions within the host economy on the other. In particular, we found that close integration of a subsidiary within its parent corporation was positively associated with high levels of local technological activity. Also, greater localisation of economic and business functions was not on its own associated with high levels of technological activity in subsidiaries. However, when that was combined with high levels of global integration, it was positively associated with high levels of local technological activity in subsidiaries.

Following another direction, we explored more tentatively whether inter-industry differences were associated with the differing intensity of technological activities in subsidiaries (Bell and Marin, 2004). At the detailed 5-digit level we found a close association between high levels of knowledge creation and accumulation in subsidiaries and local firms. This raised questions about whether such industry-specific situations might involve knowledge interactions between technologically ‘active’ subsidiaries and local firms (perhaps even knowledge-augmenting behaviour by subsidiaries), rather than merely unidirectional knowledge flows from subsidiaries. Further, these industry-specific concentrations of technologically active subsidiaries and local firms were not associated specifically with the more technologically advanced or inherently technology-intensive industries. Some were, but some were also in commodity and ‘traditional’ industries.
These results raise questions about a number of widely held views.

- FDI-related technology diffusion and spillovers in host economies are driven almost exclusively by the technological assets created by MNC parents, and subsidiaries play a passive role in the process.
- More technologically advanced (technology-intensive) industries have a greater potential than other industries to generate FDI-related spillover effects in industrialising countries.
- ‘Knowledge-augmenting’ strategies are associated exclusively with subsidiaries at the international frontier in ‘high-tech’ industries and in ‘knowledge-rich’ locations in advanced economies.
- Close corporate and global integration of subsidiaries’ is likely to have negative effects on local technological activity, and conversely the localisation of subsidiaries’ business/economic functions is likely to have positive effects.
- Consequently, with respect to the development of localised technological activities, there is a trade off between the global and local integration of subsidiaries.

With more specific reference to the Catch Up project, these results suggest that several types of heterogeneity may be important in connection with research questions about (a) the relative roles of subsidiaries and indigenous firms and (b) cross-sector differences. But there are at least three important limits to the work so far.

(i) It has been undertaken in only one country
(ii) That country is a relatively industrialised, middle-income economy with substantial human capital and related S&T resources. (Using the project terminology, it is much more ‘caught up’ than many other developing/late-industrialising economies).
(iii) The research rests on only one type of data and broad methodology – Innovation Survey data and econometric methods that, among other things, permit only indirect inferences about the knowledge-centred relationships between firms that are presumed to underlie the observed associations between aspects of FDI/subsidiary behaviour and productivity growth in local firms.

Our planned research aims to extend beyond at least the first and third of these limits.

**Planned Project: Knowledge interactions between MNC subsidiaries and host-country firms**

We expect this project to proceed in two stages – perhaps overlapping.

**Stage 1  MNC Subsidiaries and spillovers: Argentina, Brazil and India.**

In this stage we will seek to relax the first of the three limits noted above. As with the previous work on Argentina, the research will explore links between subsidiaries’ technological capabilities and knowledge spillovers. It will, however, include Brazil and India, allowing us to explore, exploit and control for country-specific characteristics. It will also involve testing whether qualitative as well as quantitative measures of technological activity (cf Costa and Queiroz, 2002) affect the potential for spillovers, for example allowing us to examine if ‘knowledge creating’ activities in subsidiaries have higher potential to generate spillover than ‘knowledge exploiting’ activities. The study will be conducted with Subash Sasidharan from the Indian Institute of Technology, Bombay and Ionara Costa from UNU-MERIT. We have access to data on India, and arrangements for access to the Innovation Surveys in Brazil are well advanced.

With respect to Question 2, this stage of the work will highlight the importance of distinguishing not only between subsidiaries and indigenous firms in absorbing, developing and diffusing technologies, but also between different kinds of subsidiaries. Further, in relation to Question 3, we can examine to what extent and

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1 There may also be interesting opportunities through the Innovation in Enterprise Group to organize and fund a larger inter-country study including countries such as Mexico and South Africa.
in what ways the relationship between sectors, technological intensity and knowledge diffusion is mediated by host country factors. In particular, does the complex and unexpected influence of inter-sectoral differences in Argentina differ across countries, following for instance differences in host countries’ static and dynamic advantages? Finally, in relation to Question 5, the project will contribute to policy conclusions – in particular, at least with respect to countries like Argentina, about the need for greater inventiveness in developing policy measures that influence the technological and other behavior of subsidiaries.

Stage 2 Knowledge relationships: corporate groups, subsidiaries and host country firms

In this stage we aim to extend beyond the third of the limits noted above. Instead of relying exclusively on Innovation Survey data and econometric methods, the work will integrate these with original interview-based survey research and the use of social network analysis (SNA) methods. The purpose will be to explore in detail the nature of the inter-firm knowledge relationships in situations involving contrasting patterns of technological activity and productivity growth in subsidiaries and local firms. The research is likely to have the following key features.

- The two methodological approaches will be integrated, not simply juxtaposed. In particular, the large scale econometric work will provide the framework for purposeful sampling of firms in the contrasting situations, while the interview survey work plus quantitative SNA methods will permit much richer interpretation of the broader econometric relationships.

- The research will examine both sets of knowledge-centred relationships within which MNC subsidiaries are embedded: the intra-MNC knowledge-relationships and the knowledge interactions with host country firms and other actors.

- The research will explicitly examine bi-directional knowledge flows within both sets of knowledge relationships, clarifying the two kinds of knowledge exploiting/augmenting role of the subsidiary at the interface between the two.

- The spatial scope of the host-country relationships will be explicitly examined in the light of concepts and questions associated with ‘regional innovation systems’.

In the first instance the work will concentrate on Argentina, though we hope to extend this to at least Brazil. In addition to the authors of this note, other initial members of the team are expected to be Dr Simona Iammarino (SPRU, University of Sussex), Dr Elisa Giuliani (University of Pisa).

REFERENCES


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2 It may be possible to extend this phase of the work beyond the middle-income countries – the second of the limits noted earlier. Indeed, a modified form of these methods may be the only possible approach in countries where there is not suitable Innovation Survey data for econometric research.