POLICY ESSAY

Who Learns From Whom? Absorptive Capacity and the Geoeconomics of Knowledge

Why Absorptive Capacity Is Becoming Increasingly Important in Geoeconomic Competition

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Summary

Firms differ in how effectively they identify, absorb and translate external knowledge into innovation - a capability known as absorptive capacity. International knowledge flows operate in multiple directions: domestic firms can learn from multinational enterprises, while multinational firms can simultaneously absorb knowledge from regional innovation systems and transfer it across international corporate networks. The essay argues that absorptive capacity therefore has not only an innovation dimension, but also a geoeconomic one. What matters is not only where knowledge is generated, but also who can absorb, develop and exploit it successfully.

Core Arguments

- Access to knowledge alone does not generate innovation: firms need absorptive capacity to identify, absorb and commercially exploit external knowledge.
- Knowledge spillovers arise through different channels, including labour mobility, cooperation, supplier relationships and foreign direct investment.
- International knowledge flows operate in multiple directions: domestic and multinational firms can learn from one another.
- Absorptive capacity has a geoeconomic dimension: international technological competition also depends on who can most effectively absorb, combine and scale knowledge generated around the world.
- The location where knowledge is generated and the location where economic value is created from that knowledge need not be the same.

Introduction

Firms learn from one another. Yet the economic returns from these learning processes are not necessarily distributed equally. Firms differ in their ability to identify external knowledge, absorb it and translate it into their own innovations. Innovation economics refers to this ability as *absorptive capacity*.

These differences take on an additional significance in international technological competition. Multinational enterprises bring knowledge into their host countries, but at the same time they can themselves learn from the technological, scientific and industrial knowledge available there. This knowledge can subsequently be transferred within international corporate networks and commercially exploited in other locations.

This raises a question that extends beyond the traditional economics of innovation:

Who learns from whom – and who has the greater ability to exploit what has been learned economically?

The argument of this essay is that *absorptive capacity* is therefore relevant not only to the innovative capabilities of individual firms. In a world of internationally interconnected knowledge flows, it may also become a geoeconomically relevant capability.

Innovation does not take place exclusively within individual firms. Firms draw on knowledge generated by customers and suppliers, universities and research institutions, employee mobility and other firms. Technological progress therefore depends not only on the production of new knowledge, but also on its diffusion and further development.

For decades, the literature on knowledge spillovers, labour mobility, inter-firm cooperation and foreign direct investment has examined such knowledge flows. What is less obvious, however, is that firms can benefit very differently from the same external knowledge environment. One firm may cooperate closely with universities, employ highly qualified staff and have access to technologically leading firms without necessarily translating these advantages into successful innovations. Another firm may derive substantial competitive advantages from comparable external sources of knowledge.

Knowledge Spillovers: Knowledge Does Not Remain Within the Firm

Knowledge differs from many material factors of production in that it can, at least to some extent, be used by multiple actors. New knowledge generated by one firm can therefore influence the innovative opportunities available to other firms.

Jaffe, Trajtenberg and Henderson showed, using patents and patent citations, that technological knowledge flows can have a pronounced spatial dimension. Audretsch and Feldman linked the geography of innovation to the spatial concentration of research, skilled labour and knowledge-intensive activities.

Geographical proximity alone, however, does not guarantee knowledge transfer. Boschma distinguishes geographical proximity from cognitive, organisational, social and institutional proximity. Firms need at least some degree of shared knowledge in order to be able to learn from one another.

This brings us to a fundamental issue in the literature on knowledge spillovers: **the existence of external knowledge is not equivalent to its successful use.**

Absorptive Capacity: Why Some Firms Learn More Than Others

Cohen and Levinthal systematically addressed this issue through the concept of *absorptive capacity*. According to their approach, firms need the ability to recognise the value of new external knowledge, assimilate it and apply it commercially. Their seminal contribution conceptualises absorptive capacity as closely related to a firm's existing stock of relevant knowledge.

Learning is cumulative in this respect. Existing knowledge facilitates the absorption of new knowledge. A firm's own research and development can therefore perform a dual function: it generates new knowledge while simultaneously improving the firm's ability to understand and exploit external technological developments.

Zahra and George developed the concept further by distinguishing between *potential absorptive capacity* – the acquisition and assimilation of external knowledge – and *realised absorptive capacity*, which concerns its transformation and exploitation.

Knowledge transfer should therefore not be equated with innovation. Between access to knowledge and the economic returns generated from it lies an internal process of organisational learning.

An Empirical Challenge: How Can Absorptive Capacity Be Measured?

Precisely because *absorptive capacity* describes an internal capability of the firm, it cannot be observed directly. R&D expenditure, human capital, patents, technological capabilities, innovation cooperation and the use of external knowledge sources are therefore frequently used as indicators.

Yet this operationalisation is not straightforward. R&D expenditure captures a firm's own research activities, but is not necessarily equivalent to its ability to absorb knowledge from, for example, customer relationships, supplier networks or cooperation with other organisations.

In my joint research with Richard Harris and John Moffat, we therefore modelled *absorptive capacity* as a latent, not directly observable, firm-level capability. Put simply, we assume that *absorptive capacity* manifests itself in the extent to which firms use external information sources and cooperation partners for their innovation activities. Since data on information sources and cooperation partners are available, they can be used to draw inferences about the underlying *absorptive capacity* and to estimate it econometrically using appropriate methods.

Based on the Community Innovation Survey, we use information on which external sources of information firms draw upon for their innovation activities and with which partners they cooperate in order to estimate this latent capability.

Our results show a positive relationship between estimated *absorptive capacity* and R&D and innovation, as well as substantial differences across European countries. Firms in several Western European economies, including Germany, exhibit comparatively high estimated levels of *absorptive capacity*.

At the same time, the results illustrate that innovative capability emerges from the interaction between internal capabilities and external knowledge opportunities. What matters is not only a firm's ability to absorb external knowledge, but also the quality and economic value of the knowledge available to it.

Many research questions remain open – including, for example, which firms within a country possess particularly high levels of absorptive capacity or which sort of knowledge can be absorbed by firms.

Labour Mobility and Learning-by-Hiring

How does external knowledge enter a firm in the first place? Employees are an important channel of knowledge transfer. While codified knowledge can be transmitted through academic publications, patents, technical documentation or data, other forms of knowledge are more closely tied to experience and individuals. This *tacit knowledge* can be transferred through personal interaction and labour mobility.

Song, Almeida and Wu show, based on the mobility of engineers, that hiring employees from other firms can serve as a channel of inter-firm knowledge transfer. What matters is not simply the change of employer, but also the knowledge an employee brings with them and how well this knowledge fits the existing knowledge base of the new firm.

Here, too, *absorptive capacity* plays an important role: a firm must be able to integrate new knowledge within its organisation and combine it with its existing capabilities.

Foreign Direct Investment and the Question of Spillovers

A similar question arises in the context of foreign direct investment. The establishment of multinational enterprises is often associated with the expectation that domestic firms will benefit from their technologies, managerial knowledge and productivity.

Empirical research shows, however, that such spillovers do not occur automatically. An important distinction is between horizontal spillovers within the same industry and vertical spillovers along value chains.

Javorcik, for example, finds evidence for Lithuania of positive productivity effects on domestic firms through *backward linkages* with multinational enterprises. Local suppliers may benefit, among other things, from higher quality requirements, technological knowledge or new production standards.

Other studies suggest that such effects may also depend on technological distance and *absorptive capacity* (e.g. Jordaan; Njikam and Njiteu Leudjou). If the knowledge gap is too large, the external technological knowledge of a multinational enterprise may be of only limited use to a domestic firm. More broadly, the FDI literature finds that the absorptive capabilities of domestic firms and regions can be important conditions shaping the extent of FDI spillovers.

The relevant policy question is therefore not only how much foreign direct investment an economy attracts, but also:

Which domestic firms are actually able to learn from it?

Knowledge Flows in Multiple Directions

The traditional spillover perspective focuses primarily on what domestic firms can learn from multinational enterprises. Research on multinational enterprises, however, shows that knowledge can flow in multiple directions within international corporate networks.

Foreign subsidiaries can absorb knowledge from their local environment, develop new knowledge themselves and subsequently transfer this knowledge within the multinational enterprise. This process is commonly referred to as *reverse knowledge transfer* (Ambos, Ambos and Schlegelmilch).

Closely related to this is the literature on *knowledge-seeking FDI* and *knowledge sourcing*. Almeida, for example, showed on the basis of patent citations in the US semiconductor industry that foreign firms can tap into local technological knowledge. His findings also indicate that foreign subsidiaries can simultaneously contribute to local technological development, illustrating that international knowledge flows need not operate in only one direction.

A foreign subsidiary can therefore serve not only to access a market or as a production location. It can also provide access to a local knowledge system. Investment locations may thus also be selected according to the technological, scientific or industrial knowledge available there.

Are Knowledge Flows Symmetric?

This changes the perspective on international investment.

When a multinational enterprise invests in a knowledge-intensive region, domestic firms may benefit from its presence. At the same time, the multinational enterprise can absorb knowledge from the region. Both processes can occur simultaneously.

It would be premature to assume that international firms generally benefit more from domestic knowledge than domestic firms benefit from them. Nor should we assume that the establishment of technologically leading firms automatically generates substantial knowledge spillovers for the domestic economy.

The interesting empirical question is therefore:

How are the gains from knowledge flows distributed?

They are likely to depend, among other things, on the *absorptive capacity* of the firms involved, technological distance, labour mobility, supplier relationships, cooperation and firms' ability to transfer acquired knowledge internally and scale it commercially.

This question is also receiving more direct empirical attention. Recent firm-level research on FDI and patent citations, for example, finds evidence of **bidirectional knowledge exchange** following foreign investment and substantial heterogeneity related to pre-existing technological capabilities and technological similarity.

From the Economics of Innovation to the Geoeconomics of Knowledge

At this point, a question from the economics of innovation acquires a geoeconomic dimension.

In international technological competition, what matters is not only which country produces the most patents, spends the most on R&D or hosts the technologically leading firms. It also matters **who has access to knowledge generated around the world and who is particularly successful at absorbing, combining and scaling that knowledge**.

Multinational enterprises have particular opportunities in this respect. They operate simultaneously within different national innovation systems and can transfer knowledge between these locations. A subsidiary can absorb knowledge in one country, transfer it within the corporate network and combine it with capabilities located elsewhere.

Absorptive capacity may therefore represent not only a firm-specific innovation capability, but also a strategic capability in international technological competition.

This perspective is particularly interesting in the context of artificial intelligence. AI may expand the possibilities for combining knowledge and data and translating them into scalable applications. At the same time, a substantial share of economically relevant knowledge remains context-dependent: knowledge of production processes, customer needs, technical problems or industry-specific applications often develops through many years of experience.

We do not yet know whether international technology firms, through their presence in such knowledge environments, absorb more knowledge than they disseminate there. This is precisely an empirical question that deserves greater scholarly attention.

Strategic Knowledge Acquisition: From Knowledge Sourcing to Industrial Espionage

Knowledge flows between firms can take different forms. Research collaborations or licensing agreements generate intentional knowledge transfer. Labour mobility, geographical proximity or the observation of technological developments, by contrast, can give rise to knowledge flows that are not intended to the same extent by the original source of the knowledge.

What represents a valuable knowledge spillover for the receiving firm may therefore be perceived as *knowledge leakage* from the perspective of another firm. This, in turn, must be distinguished from the unauthorised acquisition of trade secrets, confidential data or protected technological knowledge.

From an economic policy perspective, this creates a tension between openness and protection. International cooperation and knowledge flows can foster innovation. At the same time, there is a legitimate interest in protecting proprietary and strategically sensitive knowledge. This tension between accessing external knowledge and protecting proprietary knowledge is also recognised in the international business literature.

A simple example illustrates the economic question. A German medium-sized firm may possess unique process knowledge, production data and decades of industrial experience. A multinational technology company, by contrast, may possess extensive R&D capabilities, global corporate networks, talent, capital and the ability to scale innovations worldwide.

If both can learn from one another, the question is: **Who is better able to combine the acquired knowledge with their own capabilities and subsequently exploit it economically?**

The location where knowledge originates and the location where economic value is ultimately created from that knowledge need not be the same.

What does this mean for Innovation Policy?

Promoting research and development remains a central component of innovation policy. But it should be complemented by a second question: How can domestic firms become better able to access knowledge available around the world – in other words, how can their *absorptive capacity* be strengthened?

Firms' own technological capabilities, skilled employees, training, cooperation with universities and other firms, and well-functioning knowledge networks can provide important foundations for this. Small and medium-sized enterprises in particular may be part of a highly innovative environment and yet benefit from it only to a limited extent if they lack the human or organisational capabilities required to absorb external knowledge.

An innovation policy oriented towards *absorptive capacity* would therefore not only ask how more knowledge can be produced. It would also consider how more firms can be enabled to recognise existing knowledge, absorb it and translate it into their own innovations.

At the same time, openness to international knowledge flows remains important. International investment, labour mobility, research cooperation and global corporate networks can disseminate knowledge and foster innovation. But openness alone does not determine who derives the greatest economic benefit from these knowledge flows.

An innovation policy oriented towards *absorptive capacity* could simultaneously strengthen R&D within firms, training and highly skilled human capital, cooperation between firms and academia, and SMEs' access to knowledge networks. If firms benefit from these elements and themselves strengthen labour mobility and targeted recruitment (*learning-by-hiring*), as well as internal organisational structures for knowledge transfer, their *absorptive capacity* can be enhanced.

Conclusion

Taken together, the different strands of literature portray innovation as a process in which knowledge continuously crosses firm, regional and national boundaries. Labour mobility, cooperation, supplier relationships and multinational corporate networks represent different channels through which these knowledge flows take place.

Firms, however, differ considerably in how successfully they can absorb this knowledge and exploit it economically.

This is where the importance of *absorptive capacity* lies – and, at the same time, its geoeconomic dimension.

In international technological competition, a country does not need to generate every piece of relevant knowledge itself. What also matters is whether its firms are able to identify knowledge generated around the world, absorb it, develop it further and commercialise it.

So, who learns from whom?

Research does not provide a simple answer as to which side of international knowledge relationships generally benefits more. It does, however, show why the question matters: knowledge flows operate in multiple directions, but their economic returns need not be distributed symmetrically.

In international technological competition, it therefore matters not only **where knowledge is generated**, but also **who absorbs it, who develops it further, and where it ultimately gives rise to innovation and economic value creation.**

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