

Nikolov, "Winners and Losers in Housing Markets," Working Paper, Princeton University, 2008.

<sup>35</sup> J. Parker and A. Vissing-Jorgensen,

"Who Bears Aggregate Fluctuations and How?" NBER Working Paper No. 14665, January 2009.

<sup>36</sup> Y. Chien, H. L. Cole, and H. Lustig,

"Is the Volatility of the Market Price of Risk due to Intermittent Portfolio Re-balancing?" NBER Working Paper No. 15382, September 2009.

---

## Research Summaries

---

### International Trade and Organizations

Pol Antràs\*

The three central primitives of international trade theory are consumer preferences, factor endowments, and the production technologies that allow firms to transform factors of production into consumer goods. A limitation of traditional trade theory, however, is that the specification of technology treats the mapping between factors of production and final goods as a black box. In practice, the decisions of agents in organizations determine this mapping. Recently, international trade economists have incorporated insights from the field of Organizational Economics into their theories, thereby shedding new light on the mapping between factors of production and consumer goods. This research agenda is important for at least three reasons. First, it provides an explanation for phenomena that standard trade theory is unable to explain (such as the boundaries and hierarchical structure of multinational firms, or the determinants of intrafirm trade). Second, this literature illustrates how considering the endogenous response of organizations to changes in the economic environment

*\*Antràs is a Research Associate in the NBER's Programs on International Trade and Investment and Economic Fluctuations and Growth. He is also a Professor of Economics at Harvard University. His Profile appears later in this issue.*

(such as falling trade costs, declining communication costs, or improvements in contract enforcement) can dramatically affect or even overturn some predictions of standard models. Third, this line of models leads to a revision of key aspects of the design of efficient international trade agreements.

What follows is a brief account of some of my own contributions to the literature on international trade and organizations. In my joint survey article with Esteban Rossi-Hansberg,<sup>1</sup> we have attempted to provide a more balanced overview of this literature.

#### Property Rights and the International Organization of Production

In my Ph.D. dissertation, I studied different aspects of the recent increase in the globalization of production. I stressed the fact that in developing their global sourcing (or offshoring) strategies, firms not only decide on where to locate the different stages of the value chain, but also on the extent of control they want to exert over these processes. Firms may decide to keep the production of intermediate inputs within firm boundaries, thus engaging in foreign direct investment (FDI) and intrafirm trade, or they may choose to contract with arm's

length suppliers for the procurement of these components, thus engaging in foreign outsourcing and arm's-length trade. In order to understand systematic patterns in these firm decisions, models of the international organization of production that combine elements from international trade models and from theory-of-the-firm models are needed. In early work, I built on the influential incomplete-contracting, property-rights theory of the firm of Grossman, Hart, and Moore.<sup>2</sup>

In a first paper,<sup>3</sup> I unveil two systematic patterns in the intrafirm component of U.S. trade and show that an incomplete-contracting version of the Helpman and Krugman (1985) framework can successfully explain them. More specifically, I start out by demonstrating the existence of 1) a positive cross-industry correlation between capital intensity and the share of intrafirm imports in total U.S. imports, and 2) a positive cross-country correlation between an exporting country's relative capital abundance and the share of intrafirm trade. The theoretical model establishes that these correlations can easily be rationalized in a world in which property rights are allocated in an efficient manner across producers worldwide. The key partial equilibrium result in the paper is that vertical integra-

tion of foreign suppliers is optimal only when the elasticity of output (or sales) with respect to the final-good producer's noncontractible investments is large relative to the elasticity of output (or sales) with respect to the supplier's noncontractible investments. Because the noncontractible investments carried out by final-good producers are generally more capital-intensive than those undertaken by supplying firms (see the paper for evidence), the rationale for integration is much stronger in capital intensive sectors.

In a second paper,<sup>4</sup> I develop a theoretical framework showing that the incompleteness of international contracts leads to the emergence of product cycles, with new goods being initially manufactured in the rich North and only later in the less developed South. My framework also features the emergence of "organizational cycles," by which manufacturing is shifted abroad, first within firm boundaries and only at a later stage to independent foreign firms. I also use the model to interpret several findings of the empirical literature on the product cycle.

Finally, in a paper co-authored with Elhanan Helpman,<sup>5</sup> we introduce incomplete contracting and offshoring in the intraindustry heterogeneity model of Melitz<sup>6</sup> and study the effects of within-sectoral heterogeneity and variations in industry characteristics on the relative prevalence of different organizational forms. In a subsequent paper,<sup>7</sup> we extend our model to accommodate varying degrees of contractual frictions across inputs and countries. Our theoretical framework has become the basis for an active empirical literature attempting to shed light on the determinants of the global sourcing decisions of firms. The preliminary results of this empirical research agenda seem broadly consistent with the predictions of our theory, although future work is needed to better discriminate our model from alternative theoretical explanations of the evidence. The increasing availability of firm-level data on the sourcing decisions of firms should facilitate this task.

## **Contractual Frictions and the International Organization of Production**

Contractual frictions are not only crucial in determining the optimal allocation of control within organizations, but also affect other important decisions of firms. Why do firms appear to be so much more efficient in certain countries than in others? In joint work with Daron Acemoglu and Elhanan Helpman,<sup>8</sup> we show that the quality of contractual institutions may play an important role in shaping cross-country income differences through its effect on the technology adoption decisions of firms. By exploring the endogenous determination of the equilibrium mapping between factors of production and final goods, we are able to show that the effect of contractual frictions on productivity is more pronounced when there is greater complementarity among the intermediate inputs used in production. We show that this differential effect has important consequences for industrial structure and for understanding variation in comparative advantage across countries. Our framework also has clear implications for how firms react to variation in contractual environments in shaping their global sourcing strategies.

## **Financial Frictions and the International Organization of Production**

The bulk of the literature on offshoring and FDI generally ignores the financial side of these transactions. Mihir Desai, C. Fritz Foley,<sup>9</sup> and I study how FDI flows and patterns of multinational firm activity are jointly determined in a world with frictions in financial contracting. In our joint work, we develop a model in which multinational firm activity does not arise to avoid risk of technological expropriation by local partners, but rather because of the demands of external funders who require the participation of multinational firms to ensure value maximization by local entrepre-

neurs. The main novel predictions of the model are that weak investor protection increases the attractiveness of deploying technology abroad through FDI rather than arm's length technology transfers, and it increases the share of activity abroad that is financed by capital (FDI) flows from the multinational parent. We test the predictions of the model using detailed firm-level data on U.S. outbound FDI and find support for the empirical relevance of our theory. Consistent with the model, we find that these effects of weak investor protection are most pronounced for technologically advanced firms.

Empirical evidence suggests that cross-country variation in investor protection not only affects the geography of FDI flows and multinational activity, but also shapes the pattern of international trade across countries. In joint work, Ricardo Caballero and I<sup>10</sup> revisit the robustness of one of the classical results in neoclassical trade theory to the introduction of heterogeneity in investor protection across countries. In particular, we find that the mere introduction of heterogeneous financial frictions in the Heckscher-Ohlin model overturns the classical substitutability between trade and capital mobility in the standard model. More precisely, we find that in less financially developed economies, trade and capital mobility are complements, in the sense that trade integration increases the return to capital and thus the incentives for capital to flow to the South. An important implication of our framework is that increased protectionism can aggravate the so-called "global imbalances" around the world.

## **Knowledge and the International Organization of Production**

Another important friction in the international fragmentation of production is related to the costly communication of information between members of cross-border production teams. Luis Garicano, Esteban Rossi-Hansberg, and

I<sup>11</sup> develop models of international offshoring in economies in which agents have heterogeneous abilities and sort into teams competitively. In these models, an important role of the organizational structure of firms is to facilitate efficient communication of knowledge within teams. Our models illustrate how the quantity, quality, and effects of international offshoring are related to the distribution of skills in the population and to the state of communication technologies. They also shed light on the role of host-country management skills (that is, middle management) in bringing about the emergence of international offshoring. In particular, we show that by shielding top management in the source country from routine problems faced by host country workers, the presence of middle managers improves the efficiency of the transmission of knowledge across countries.

## Implications for Trade Policy

Although the bulk of the papers discussed above focus on positive issues, they also bear on important policy questions. A potentially fruitful avenue of research concerns the role of trade policy in a world where firms make organizational decisions under incomplete contracts. Robert Staiger and I provide a first attempt in this direction.<sup>12</sup> We study the implications of the fact that, in transactions involving significant lock-in effects (perhaps because of ex-ante customization of goods, or search frictions), prices tend to be negotiated bilaterally and are not fully disciplined by market-clearing conditions, as in traditional theory. In the paper, we show that trade policy changes in local prices can have spillover effects in other countries, even when they hold constant international (untaxed) prices, thus leading to predictions quite distinct from those of the traditional terms-of-trade theory of trade agreements. As a consequence, we argue that the growing prevalence of offshoring and service trade (which are often associated with lock-in effects) is likely to make it increasingly difficult

for governments to rely on traditional GATT/WTO concepts and rules (such as market access, reciprocity, and non-discrimination) to help them solve their trade-related problems.

In recent work,<sup>13</sup> Arnaud Costinot and I explore the implications of search frictions and bilaterally negotiated prices for the worldwide distribution of the gains from international trade. Our models illustrate the potentially crucial role of intermediaries in bringing to life the gains from international exchange, but they also suggest that active policies might ensure that the margins charged by these middlemen allow the potential benefits from international integration to materialize. Although caps on foreign intermediaries' margins (for example, "fair" prices) can be welfare improving in certain scenarios, we show that they typically reduce the benefits of international trade.

## Next Steps: Dynamics

Combining trade theories with organizational theories sheds new light on international trade phenomena and has sparked empirical and normative work attempting to better understand these facts. Nevertheless, much remains to be done. For instance, most of the work in this area is static in nature. In dynamic environments, organizations might be able to adjust to contractual or financial frictions in subtle ways that are not captured by the available frameworks. An important branch of organizational economics is concerned with these dynamic effects, but these developments thus far have only had a small impact in the trade and organizations field.

<sup>1</sup> P. Antràs and E. Rossi-Hansberg, "Organizations and Trade," NBER Working Paper No. 11262, August 2008, published in *Annual Review of Economics*, Vol. 1 (January 2009), pp. 43–64.

<sup>2</sup> S. J. Grossman and O. D. Hart, "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral

Integration," *Journal of Political Economy*, 94:4 (1986), pp. 691–719; O. D. Hart and J. H. Moore, "Property Rights and the Nature of the Firm," *Journal of Political Economy*, 98:6 (1990), pp. 1119–58.

<sup>3</sup> P. Antràs, "Firms, Contracts, and Trade Structure," NBER Working Paper No. 9740, June 2003, published in *Quarterly Journal of Economics*, Vol. 118, No. 4 (November 2003), pp. 1375–1418.

<sup>4</sup> P. Antràs, "Incomplete Contracts and the Product Cycle," NBER Working Paper No. 9945, September 2003, published in *American Economic Review* 95, No. 4 (September 2005), pp. 1054–73.

<sup>5</sup> P. Antràs and E. Helpman, "Global Sourcing," NBER Working Paper No. 10082, November 2003, published in *Journal of Political Economy* 112, No. 3 (June 2004), pp. 552–80.

<sup>6</sup> M. Melitz, "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity," NBER Working Paper No. 8881, April 2002, published in *Econometrica* 71 (November 2003), pp. 1695–1725.

<sup>7</sup> P. Antràs and E. Helpman, "Contractual Frictions and Global Sourcing," NBER Working Paper No. 12747, December 2006, published in E. Helpman, D. Marin, and T. Verdier, *The Organization of Firms in a Global Economy*, Harvard University Press, 2008, pp. 9–54.

<sup>8</sup> D. Acemoglu, P. Antràs, and E. Helpman, "Contracts and the Division of Labor," NBER Working Paper No. 11356, December, published as "Contracts and Technology Adoption" in *American Economic Review* 97, No. 3 (June 2007), pp. 916–43.

<sup>9</sup> P. Antràs, M. Desai, and C. F. Foley, "Global Multinational Firms, FDI Flows and Imperfect Capital Markets," NBER Working Paper No. 12855, January 2007, published in *Quarterly Journal of Economics* 124, No. 3 (August 2009), pp. 1171–1219.

<sup>10</sup> P. Antràs and R. J. Caballero, "Trade and Capital Flows: A Financial Frictions Perspective," NBER Working Paper

No. 13241, July 2007, published in *Journal of Political Economy* 117, No. 4 (August 2009), pp. 701–44.

<sup>11</sup> P. Antràs, L. Garicano, and E. Rossi-Hansberg, “Offshoring in a Knowledge Economy,” NBER Working Paper No. 11094, January 2005, published in *Quarterly Journal of Economics* 121, No. 1 (February 2006), pp. 31–77; P. Antràs, L. Garicano, and E. Rossi-

Hansberg, “Organizing Offshoring: Middle Managers and Communication Costs,” NBER Working Paper No. 12196, May 2006, published in Helpman, E., D. Marin, and T. Verdier, *The Organization of Firms in a Global Economy*, Harvard University Press, 2008, pp. 311–39.

<sup>12</sup> P. Antràs and R. W. Staiger, “Offshoring and the Role of Trade

Agreements,” NBER Working Paper No. 14285, August 2008.

<sup>13</sup> P. Antràs and A. Costinot, “Intermediated Trade,” NBER Working Paper No. 15750, February 2010; Antràs and A. Costinot, “Intermediation and Economic Integration,” NBER Working Paper No. 15751, February 2010.

## Bubbles, Liquidity, and the Macroeconomy

Markus K. Brunnermeier\*

The recent financial crisis has shown that financial frictions, such as asset bubbles and liquidity spirals, have important consequences, not only for the financial sector but also more generally for the macroeconomy. This forces economists to reevaluate firmly held beliefs about market efficiency, the appropriate regulation of financial markets, and approaches to macroeconomic policymaking. The subsequent paragraphs summarize my ongoing research in these domains.

### Asset Price Bubbles

Under the efficient market hypothesis, bubbles burst before they even have a chance to emerge. Hence, an asset’s market price should correctly reflect its underlying fundamental value. However, bubbles historically have emerged as investors were willing to hold assets, even when their prices exceeded their fundamental value—they hoped to sell these assets at an even higher price to some other investor in the future. In a setting

*\*Brunnermeier is a Research Associate in the NBER’s Program Asset Pricing and the Edwards S. Sanford Professor of Economics at Princeton University. His Profile appears later in this issue.*

in which a single investor alone cannot bring down a bubble, it can be rational for an individual to ride the bubble. In other words, the uncertainty of not knowing when other investors will start trading against the bubble makes each individual rational investor anxious about whether he can afford to be out of (or short) the market until the bubble finally bursts. Consequently, each investor is reluctant to lean against the bubble and might even prefer to ride it. Thus price corrections only occur with delay, and often abruptly.<sup>1</sup> My empirical research with Stefan Nagel studies hedge funds’ holdings of technology stocks during the internet bubble, and it confirms that even sophisticated investors were riding the bubble rather than leaning against it.

The second important message of this line of research is that small, fundamentally unimportant news can trigger large price swings. Such information can serve as a synchronization device that triggers the attack on a bubble. This explains why most large asset price movements are not associated with important news announcements.<sup>2</sup> It also suggests that communication by central bankers and regulators is a very important policy tool.

The bubble-riding hypothesis also provides a different view of risk measures. Even though risk seems to be tamed while the bubble is inflating, risk and imbalances are building up below the surface, and volatility suddenly spikes when the bubble bursts. This is in contrast to the efficient market view, which asserts that contemporaneous risk measures appropriately capture current risk exposure.

### Credit Bubbles and Liquidity Spirals

One important lesson from the current crisis is that credit bubbles, like the recent housing bubble or the stock market bubble in the 1920s, can be much more detrimental than the bubbles that are not financed with debt, such as the internet bubble. The reason is that during the bursting of a credit bubble, amplification effects exacerbate initial shocks and impair the financial system.

My paper “Deciphering the Liquidity and Credit Crunch”<sup>3</sup> describes the transformation of the banking system to one that increasingly relied on wholesale funding and the emergence of the