

“Trade and Market Thickness: Effects on Organizations”

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Abstract. Globalization, by raising the number of buyers available to each seller and the number of sellers available to each buyer, raises the *thickness*, or the effective number of participants, of every market. Market thickness can have subtle effects on incentives and organizations, alleviating hold-up problems, resulting in less vertical integration, more informal contracting, and more cooperative and innovative relationships with subcontractors. However, it can also weaken long-run relationships, distorting relationship-specific investments and risk-sharing. This paper surveys the theory and empirical evidence, indicating when market thickness helps and when it hurts.

When an economy is opened up to international markets, one inevitable result is that markets become thicker. Market thickness can have large effects on economic outcomes, independently of the resource allocation effects usually studied by trade economists. The purpose of this note is to provide an overview of some recent research that has begun to study these effects.¹ I will begin with a discussion of the idea of market thickness, and identify what I see as the two main strains that have come out of the work so far.

1. The Concept of Market Thickness. Define a rise in market thickness as any increase in the effective number of firms in a given market, in the sense that there is an increase in the probability that any given agent will be able to find in a given length of time an agent with whom it will be possible to realize gains from trade. It must be emphasized that this is distinct from an increase in *competition*. In an oligopoly, for example, increasing the number of producers will push price closer to marginal costs, lowering deadweight losses and increasing welfare in a manner that is well understood, but those effects are not what is meant here by market thickness. Indeed, in many of the papers discussed below, competition effects are absent by construction.

A rise in market thickness can occur in many ways. Here are a few examples.

(i) A rise in the number of market participants. If the number of buyers and sellers of used cars is fixed at 1, then the car sold by the sole seller may or may not be a match for the needs of the sole buyer; but if the numbers on both sides of the market are raised to 1,000, the odds that each will be able to find a match are much improved. However, what needs to be pointed out is that this can also be attained not only by actually raising the number of participants, but also by broadening the definition of the market, and that this can be achieved by removing a barrier to trade. If France and Italy have equal-sized automotive sectors, and if one day the wall of autarchy is broken down between them, forming a single automotive market, then the market thus made will be twice as thick as the individual markets had been.

(ii) Increased versatility of participants. Holding constant the number of buyers and sellers, an increase in market thickness can be achieved by broadening the scope of customers that each seller could service, or the range of types of good that each customer is capable of using. For example, if the fraction of Turkish manufacturers with the latest ISO compatibility is increased, then that will increase the number of potential outsourcing partners for any given German manufacturer.

(iii) Improvements in search efficiency. For example, the development of internet-based institutions for finding employees, employers, and suppliers raises the probability of finding a transaction partner in a given length of time, without any change in the number of participants or their attributes.

A point to make about all three of these sources of market thickness is that they are all part

¹Although the term is rather new in international economics, it has a long history in other areas. It has long had an important role in the study of financial markets and commodity exchanges; Telser (1981) is a prominent example. It has also had an important if informal role in the transactions cost literature; see, for example, the literature review in Hubbard (2001).

and parcel of the process of globalization. Removal of trade barriers can lead to (i), increased technological compatibility that leads to (ii) is an important component of globalization, and improvements in search technology that make it easier to purchase or hire all over the world are part of what propel the unification of world markets forward. (See Freund and Weinhold (2000) for evidence on the importance of the internet in the expansion of world trade.) At the same time, international integration of labor markets or of markets for industrial inputs can itself improve the efficiency of search, either through increasing returns to scale in search (if there are any) or through increased flexibility in each agent's choice of where to search. For all of these reasons, one could argue that it is difficult to think about globalization long without market thickness coming into the discussion, and vice versa.

The remainder of this note discusses two kinds of market-thickness effects that have received attention in recent work, focussing on the effects they have on behavior of organizations in settings of incomplete contracts. The two types of effect can be summarized as: (i) Market thickness as a brake on opportunism, and (ii) Market thickness and the fraying of relationships. The first is essentially a hidden benefit to globalization, while the second can be a hidden cost.

2. *Market thickness as a brake on opportunism.* The idea here is simple: If an agent has made a sunk, relationship-specific investment, its partner is more likely to be able to appropriate the quasi-rents the thinner is the market, because if the probability is low that the agent will be able to find an alternative transactions partner, its *ex post* bargaining power will therefore be low. Thus, thickening the market can relax opportunism problems, and this can have an effect on the structure and behavior of organizations.

This argument is put forward in McLaren (2000). A central claim of that paper is that globalization can lead to a reduction in vertical integration, through market thickness effects. Consider an industry with n pairs of firms, one member of each pair being an upstream firm and the other a downstream firm. Each upstream firm can produce one unit of a specialized, indivisible input for its corresponding downstream firm. This requires that the upstream firm incur a non-contractible sunk cost. If contractual solutions are unavailable, the downstream firm has two options. It can purchase the asset used to make the input and operate the asset itself. This is vertical integration, which creates inefficiencies due to the 'governance costs' of running a more complex organization. The second option is arm's length procurement, or outsourcing, in which the upstream firm produces the input and then bargains over the price, hoping to be able to recoup its sunk cost. The fear that it may not be able to recoup those costs, and the possibility of socially inefficient actions that it may take to increase its chances of doing so, constitute the 'hold-up' problem, which is the disadvantage of the arm's length method.

Thus far, the problem is a standard Williamsonian hold-up problem. However, the point is that the severity of the hold-up problem is endogenous to the vertical integration decision. This results from endogenous specialization decisions. Each integrated firm simply produces its own input, optimized for its own use, and has no need to consider any outside suppliers, but a non-integrated supplier will try to preserve some flexibility, and will make the input less specialized to

its intended user in order to make it potentially useful to other buyers as well and thus preserve some bargaining power. Now, consider that if all firms are vertically integrated, there will be for all practical purposes no market for inputs. Each firm will simply produce its own input, optimized for its own use, and will have no need to consider any outside suppliers, whose inputs would necessarily be less attractive to it. Thus, any one non-integrated upstream firm would have trouble finding an interested alternative customer, and so its bargaining power against its intended customer would be very limited. The hold-up problem would thus be severe. On the other hand, if a sufficient number of other firm pairs has remained non-integrated, then their inputs will be less finely tuned to their downstream customers and those customers may be willing to consider a competing input. There is now a real market for inputs, which any non-integrated supplier can use as a source of bargaining power. This lessens the hold-up problem, making arm's length trade more feasible.

Because of this, arm's length procurement will not work for any given upstream-downstream pair unless a sufficient number of other pairs are also non-integrated. We thus have multiple equilibria: It is always an equilibrium for all firms to be integrated, but if there are enough firm pairs to begin with, there is also a second equilibrium in which no firm is integrated. This second equilibrium is strictly more efficient. Finally, eliminating a trade barrier, by raising the effective number of firms in the market, may be what is needed to make the more efficient non-integrated equilibrium possible (recall mechanism (i) above). Thus, globalization in this case promotes a more efficient organizational form.

Related propositions regarding vertical integration have been developed in various papers, but they follow different mechanics than what is explored here. Grossman and Helpman (2002) offer a general equilibrium model that endogenizes vertical integration decisions. In one version of this model with increasing returns to search, a rise in market thickness leads to a reduction in vertical integration. However, this is not because market thickness acts as a brake on opportunism; rather, improved search makes non-integrated production more attractive because it is assumed that a downstream firm must search for a partner under non-integration, but does not need a partner under integration. Ramey and Watson (2001) and Matouschek and Ramezzana (2002) both show that in their models a rise in market thickness can lead to less vertical integration (although in the former paper it could also go the other way; see their footnote 9). However, those findings have to do with the effects on relationships that will be discussed below, rather than with alleviating opportunism.

A different angle on the opportunism question is studied in McLaren (1999). That paper argues that globalization can lead to more informal and cooperative relations between manufacturers and suppliers, through market thickness effects, and that this can lead to more innovation. The argument is based on a model, again, with n pairs of upstream and downstream firms and a single unit of specialized input to be produced and traded between them, but here, for the sake of argument, assume that vertical integration is not an option. The procurement options are (i) contracts and (ii) doing business on a 'handshake.' Suppose that the only third-party verifiable information is the delivery of a usable unit of the input, and the price paid. This implies that the only feasible contracts will be fixed-price (this simplifies the argument but is not necessary). On the other hand, if the two firms do business on a handshake, the upstream firm produces the input and then the pair bargains

over its price. In comparisons between Japanese and American outsourcing, case-study evidence suggests that in the past, contractual procurement has been more common among American firms, and informal arrangements, something like the handshakes described here, have been more common among Japanese ones (although these practices have changed a great deal in recent years and that is much less the case now).

There are two kinds of non-contractible *ex ante* investment. ‘Autonomous’ investment is undertaken by the upstream firm on its own. This involves effort to maintain tight cost discipline and quality control. ‘Joint’ investment involves effort to fine-tune the design of the part being produced, and this requires complementary efforts by *both* firms. Autonomous investment makes the input more attractive to any buyer, by improving reliability and overall quality, while joint investment makes it more attractive only to the participating downstream partner. Thus, joint investment is relationship-specific, while autonomous investment is not. Extensive anecdotal evidence shows that both types of investment are important in outsourcing in practice.

A contract provides efficient incentives for autonomous investment, because it forces the upstream firm to pay the cost of any cost overruns at the margin. However, it kills incentives for joint investment. An innovation that lowers the cost of producing the input, for example, will provide no benefit to the downstream firm under contractual procurement, so the downstream firm will have no incentive to do the complementary investment needed to bring it to fruition. On the other hand, a handshake provides mediocre incentives for both kinds of investment. The reason is that the two firms split the joint *ex post* surplus, thus giving each party one half of the marginal benefit of any investment.

Now, suppose that one breaks down a trade barrier, thus thickening the market. This will raise the attractiveness of doing business on a handshake, relative to contractual procurement. The reason is that the upstream firm benefits in the bargaining if it has a credible threat to abandon the current downstream partner and sell to another one instead. That threat is enhanced by autonomous investment, since such investment makes the input more attractive to all potential buyers, but this effect is small if the market is thin and the probability of finding an interested buyer is therefore low. The thicker the market, the larger is this probability, and so the greater is the value to the upstream firm of a marginal increase in autonomous investment. Therefore, in a thick market, the advantage of contracts as opposed to handshakes is eroded, and for a sufficient increase in thickness, all firms switch from contracts to handshakes, and the overall level of cooperative innovation rises sharply.

Empirical evidence. There is a small but growing body of evidence on these types of effects. Holmes (1999) shows that in US Census of Manufactures data, an industry tends to be less vertically integrated in geographic locations where it is most densely concentrated. Although the interpretation in that paper differs from the theory discussed here, the finding is quite consistent with market thickness effects. Pirrong (1993) showed that thicker markets for bulk shipping tend to have more informal contracting. Hubbard (2001), studying US trucking, finds that in US states that have a thicker market for trucking services, trucking is less vertically integrated (that is, firms are more likely to employ an independent trucking company rather than use their own trucks), and there is less

use of contracts in favor of more informal dealings (termed ‘common carrier’ shipping).

3. *Market thickness and the fraying of relationships.* Note that in the stories discussed above, thickening the market had a beneficial effect on efficiency. However, there can be a dark side to market thickness: If, in a world of incomplete contracts, people rely on long-term relationships to deal with incentive problems, any change in the environment that makes it easier to find a new partner can weaken commitment to those relationships, and at times this can have adverse consequences. This idea has implications for a broad range of economic questions.

A pioneering paper in this line is Ramey and Watson (2001). Consider an economy populated by agents of type A and type B. An A and a B must work together in order to produce output. It is necessary for them to find each other first, however, and so search has a crucial role. There are two incentive problems that the agents must face when they attempt to cooperate. First, at the beginning of the relationship, the two agents must both make a sunk, relationship-specific investment. Second, in each period thereafter, both must exert non-contractible effort. If either shirks on the effort, output in that period will be greatly diminished, trust will be destroyed, and both agents will need to reenter the search pool to find new partners.

Because of the information structure of the model, contractual solutions to these problems are not available. Therefore, the two agents strike a self-enforcing agreement within the context of a long-run relationship. In each period, each agent will be tempted to cheat by shirking on effort. A shirking agent will enjoy a one-period gain in utility because she will be playing the part of a free rider, who receives some productivity benefit from the other agent’s effort while incurring no effort cost of her own. This short-run benefit must be no greater than the long-run cost that results from the break-up of the relationship. This is the incentive compatibility constraint (IC). In equilibrium, no relationships end through cheating, but a small number end randomly each period (Ramey and Watson consider the limit as that break-up rate vanishes).

If the IC constraint binds, then each agent has some incentive to increase *ex ante* investments in order to make the relationship more attractive to both agents and thus loosen the constraint. This leads to the welfare result. First, suppose that search frictions are very severe, so that it is very difficult to find a new partner for anyone who is without one. In this case, the IC constraint will not bind, since the prospect of ostracism is very frightening. In this case, there is *ex ante* underinvestment, for the same reasons as there would be in a static model: Each agent receives only a portion of the marginal product of its own investment. Now, suppose that search frictions become less severe. As the state of search looks more and more attractive, a point is reached at which the IC constraint begins to bind. That, then, induces an increase in *ex ante* investment as each agent attempts to loosen the IC constraint by making the relationship more attractive. Since the initial investments were suboptimal, this is a positive development. Now, allow search frictions to become very weak, so that one can find a new partner essentially at once. Now, there is an extremely strong temptation to shirk, and thus both agents do an enormous amount of *ex ante* investment. It is quite possible for the equilibrium level of investments to go above the socially optimal level. In this case, welfare is maximized at an interior level of market frictions. Beyond that point, improvements in

the market process lower welfare.

A similar idea is applied to the question of globalization and risk in McLaren and Newman (2002). Here, the argument is that globalization can lead to a reduction of risk-sharing within relationships, perhaps increasing individual risk-bearing. This is a model with a population of risk-averse agents, each of whom receives an exogenous, non-storable, iid random endowment in each period. Each would like to pool risks with other agents, but they face two constraints in doing so. First, the size of an agent's endowment cannot be observed by anyone other than that agent and at most one other agent. (One might think of a two-person apartment or office, within which two people must work or live together in order to observe each other's idiosyncratic shocks.) This implies that one cannot share risk with more than one other person, and one cannot write a third-party enforceable contract in order to do so. Thus, a long-run relationship is crucial. Second, the presence of search frictions implies that finding a partner takes time. Again, partnerships face an exogenous break-up probability (here, that probability is not made to approach zero).

Within each relationship, risk-sharing works as follows: If one partner has a big endowment this period and the other has a small one, the lucky partner gives a transfer to the unlucky one. Reneging on a mutual promise of this sort of risk-sharing would imply that the lucky partner consumes his entire endowment, resulting in higher utility in that period. Thus, there is a short-run temptation to renege, which is weighed against the long-run cost of losing the existing relationship and going back into the search pool to find a new partner. This balance defines the IC constraint within the relationship. Globalization reduces search frictions, making it easier to find a new partner, and thus reducing the punishment from reneging, which tightens up the IC constraint, and reduces the amount of risk-sharing within the relationship. This indirect effect of globalization lowers expected utility, but it must be weighed against the direct effect, the improvement in search frictions, which softens the risk of exogenous separations. The positive direct effect and the negative indirect effect combine to produce an interior optimal level of globalization.

Some related work. Kranton (1996) takes the tension between effective search markets and long-run relationships in a different direction by showing how either of these can drive the other out of existence. The model has multiple equilibria, and it is possible to have all agents using an anonymous market, making bilateral cooperation impossible, or have a collapse of the market, with all agents using bilateral cooperation. Either outcome could be highly inefficient, and the model is intended as a metaphor for the diverse forms of economic interaction one finds in the Third World. Attanasio and Ríos-Rull (2000) show that in a model with risk-sharing through long-run relationships, government insurance of aggregate shocks can worsen private sharing of idiosyncratic shocks for reasons much like those described above, namely the tightening of IC constraints, with a drop in welfare as a possible result. Spagnolo (2001) shows how cooperation through long-run relationships can be hurt by an improvement in the functioning of financial markets.

Matouschek and Ramezzana (2002) show how an improvement in search frictions can make exchange more difficult in a world of asymmetric information. As is well known, when buyers and sellers meet and bargain under asymmetric information, there is always a risk that they will fail to

complete a transaction despite positive gains from trade, because each tries to avoid revealing private information to the other. If agents who do not succeed in realizing their transaction then go into the search pool to find other partners and begin again, then an improvement in search frictions increases the attractiveness of entering that search pool, thus making both buyers and sellers more aggressive in bargaining and lowering the probability of a trade in any given period of interaction. It is possible for welfare to go down as a result.

Empirical evidence. There is suggestive evidence of some of these effects. Bertrand (2002) provides evidence of weakening long-term relationships in US firms that have been hit by tough import competition. In those firms, the wage paid to workers is more responsive to fluctuations in labor demand than in firms less affected by imports. Cox et. al. (1997) find a breakdown in intra-family risk-sharing transfers in Poland as the market economy became pervasive. Scheve and Slaughter (2002) show that British workers tend to describe a higher level of insecurity, the more multinationals have moved into their local area. An anecdotal account of a broad erosion of the importance of long-term relationships in Japan as the economy became more open is found in Kristof (1997).

In conclusion, international openness can have wide-ranging effects through market-thickness channels alone, which have fairly recently been realized and have been the subject of a surge of recent work. A smattering of empirical work has suggested that these may be important in practice.

References.

Attanasio, Orazio, and José-Víctor Ríos-Rull (2000). "Consumption Smoothing in Island Economies: Can Public Insurance Reduce Welfare?" *European Economic Review* 44, pp. 1225-58.

Bertrand, Marianne (2002). "From the Invisible Handshake to the Invisible Hand? Product Market Competition, Financial Pressures, and the Employment Relationship." Mimeo, University of Chicago.

Cox, D., Jimenez, E., and Okrasa, W. (1997). "Family Safety Nets and Economic Transition: A Study of Worker Households in Poland." *Review of Income and Wealth* 43:2, pp. 121-209.

Freund, Caroline L. and Diana Weinhold (2000). "On the Effect of the Internet on International Trade." Working paper: Board of Governors, Federal Reserve Board.

Grossman and Helpman (2002). "Integration versus Outsourcing in Industry Equilibrium." *Quarterly Journal of Economics*, 117:468 (February).

Holmes, Thomas J. (1999). "Localization of Industry and Vertical Disintegration," *Review of Economics and Statistics* 81:2 (May), pp. 314-25.

Hubbard, Thomas N. (2001). 'Contractual form and market thickness in trucking.' *RAND Journal of Economics* 32:2 (Summer), pp. 369-86.

Kranton, Rachel E. (1996). "Reciprocal Exchange: A Self-Sustaining System." *American Economic Review* 86:4 (September), pp. 830-51.

Kristof, Nicholas D. (1997). "Real Capitalism Breaks Japan's Old Rules." *New York Times*, July 15.

Matouschek, Niko and Paolo Ramezzana (2002). "Market Efficiency and Vertical Structure in a Faster World." Mimeo, University of Virginia.

McLaren, John (1999). "Supplier Relations and the Market Context: A Theory of Handshakes." *Journal of International Economics* 48:1 (June), pp. 121-38.

_____ "Globalization' and Vertical Structure," *American Economic Review* 90:5 (December 2000).

_____ and Andrew Newman (2002). "Globalization and Insecurity." University College London Department of Economics Discussion Paper #02-06.

Pirrong, S.C. "Contracting Practices in Bulk Shipping Markets: A Transactions Cost Explanation." *Journal of Law and Economics*, Vol. 36 (1993), pp. 937–976.

Ramey, Garey and Joel Watson (2001). "Bilateral Trade and Opportunism in a Matching Market." *Contributions to Theoretical Economics* 1:1.

Scheve, Kenneth and Matthew J. Slaughter (2002). "Economic Insecurity and the Globalization of Production." Mimeo, Tuck School of Business at Dartmouth.

Spagnolo, Giancarlo (2001). "Markets and Cooperation." Stockholm School of Economics/EFI Working paper No. 257.

Telser, Lester G. (1981). "Why There are Organized Futures Markets." *Journal of Law and Economics* XXIV:1 (April), pp. 1-22.