

On market integration and the development of institutions: The case of international commercial arbitration

Alessandra Casella *

Department of Economics, Columbia University, New York, NY 10027, USA

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Abstract

This paper suggests that the institutional basis necessary to support efficient international trade is provided not only by treaties among national governments but also by international coalitions of private agents. International commercial arbitration is an important example of these private coalitions. The paper reviews the provisions and the practice of international arbitration, and presents a general equilibrium model of the relationship between the expansion of international trade and the adoption of arbitration. The model shows that arbitration alters the size and composition of markets, while at the same time responding to exogenous changes in trade.

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1. Introduction

One of the most interesting challenges accompanying the progressive integration of economic markets is the design of appropriate institutions to safeguard and improve the efficiency of international private transactions. Debates over the relative power of the governing bodies of the European Union versus the national

* Corresponding author. Telephone: (212) 854-2459, Fax: (212) 854-8059

governments, for example, or fears that the World Trade Organization may prove too tight a constraint on sovereignty, or discussions of harmonization of technical standards as precondition to free trade, are all examples of this general question. The problem is always presented as the alternative between a wider role for international organizations – the result of formal treaties among countries – and national sovereignty.

This paper suggests a different approach. Contrary to the traditional exclusive emphasis on national policy, could the integration of markets be accompanied by the formation of *international coalitions of private individuals*, organizing themselves to finance and share the public goods they need for efficient trade? In other words, could the organization of really international markets be shaped ‘from the bottom’, from the voluntary actions of individuals active on the markets, and united by their common economic interests rather than by their common nationality? The conjecture seems plausible but has been overlooked by economists. The goal of this paper is to propose that it should provide a complementary approach to more traditional analyses.

How relevant the shift in emphasis is in practice is an empirical question. How frequent and how influential are the private coalitions that theory predicts should form? To what extent do they take over functions that we traditionally associate with national governments? To begin addressing these questions, the paper discusses one important example: the rapidly expanding recourse to arbitration to solve international private commercial disputes.

International arbitration is understood to provide a ‘supra-national’ jurisdiction created by international businessmen, shaped by the evolution of international markets, and itself responsible for some of this evolution. It has been theorized as the road towards a transnational law, a ‘self-made economic law’ created spontaneously by private traders and evolving independently of national parliaments and national courts.¹ While we discuss tensions between the expansion of markets and national sovereignty, businessmen have perfected a judiciary system that exists above national borders: “Arbitration is a kind of social jurisdiction, opposed to state jurisdiction. International commercial arbitration is the jurisdiction of the business circles engaged in international trade.” (Jakubowski in Schultz and van den Berg (1982, p. 178)). In this view, debated by scholars of comparative law (for example, David (1985)) and by sociologists and political scientists (for example, Deutsch (1953)), arbitration is the expression of peaceful forces towards international integration triggered by trade.

Far from being merely a theoretical possibility, arbitration is the most frequent mechanism for the settlement of private disputes in international trade. According

¹ The expression was coined by Grossman–Doerth, quoted in Langen (1973). The relationship between economic change and the development of institutions, exactly in the terms discussed here, is the focus of the work of Douglass North. See, for example, North (1981).

to officials of the Netherlands Arbitration Institute, more than 80 percent of private international contracts have clauses providing that disputes will be decided by arbitration. Mentschikoff (1961) reports the results of a survey of 250 commercial associations in the United States mainly involved in international trade. According to the survey, 82 percent of them use arbitration. In the legal literature, all scholars seem to agree that “international arbitration is regarded by the international business community as the normal means of settling disputes arising from international transactions” (Schmitthof, in Schultsz and van der Berg (1982, p. 287)). Lawyers and judges report that recourse to arbitration is rising exponentially: “there is clear evidence of something of a world movement..[towards international arbitration]” (Kerr, Lord Justice of England, preface to Craig et al. (1990, p. xii)). The movement has been noted by the popular press: The Economist calls arbitration “the Big Idea set to dominate legal-reform agendas into the next century” (7/18-24/1992, p. 17 of the survey on the legal profession).

This paper is organized into two main parts. The first part describes the provisions regulating arbitration, and the functioning of the International Chamber of Commerce in Paris, the most important of the institutions administering international arbitration. The second part of the paper presents a simple general equilibrium model where the contemporaneous link between arbitration and the expansion of international markets can be studied formally.

Four main points are made clear by the description of the practice of arbitration. First, arbitration relies for its final enforcement on the authority of the national courts, and in the modern world should not be thought of as an example of private enforcement of contracts. Nevertheless, the arbitration tribunals have remarkable latitude in their decisions, and a body of law is developing through the published deliberations of the arbitration courts, deliberations increasingly taken as precedent in successive decisions. According to most legal scholars, this is effectively leading to a distinctive legal doctrine: “In an increasing number of international disputes, arbitrators have determined that the obligations of the parties are to be determined according to international trade usages and customs ... without reference to a specific national law” (Craig et al., 1990, p. 295).

Second, arbitration occupies a privileged position in international disputes. International treaties make international arbitral awards easier to enforce abroad than courts’ decisions, and special provisions in national laws make international awards more difficult to appeal than national arbitral awards. In addition, businessmen see arbitration as a way of avoiding the uncertainty of little known foreign laws. Arbitrators are considered more competent and more reliable than the courts, and not surprising these feelings are reinforced with respect to foreign courts.

Third, an important side of arbitration is the possibility to give highly specialized judgments. Through arbitration, traders have access to judges who are familiar with the ‘usages of the trade’ and with the technicalities of the specific transaction being reviewed. While national laws must respond to the very different needs of all citizens of a country, arbitration is tailored to the particular type of

economic activity. The role of arbitration is tied to the heterogeneity existing among economic agents.

Finally, the main trade-off faced by potential users of arbitration is between quality of judgment and likelihood of enforcement, on one side, and cost on the other. Careful and easily enforceable awards are mainly given in proceedings supervised by large arbitration institutions, but in international cases the services of these institutions are very expensive. The result is a natural selection leading large contracts towards international arbitration, and smaller business deals towards the national courts. This is in contrast to the use of arbitration in domestic disputes, where one of arbitration attractions is its relative low cost.

These four features shape the assumptions through which arbitration is represented in the model: arbitration must be enforced by the courts; is particularly important in international transactions; is essentially linked with heterogeneity among economic agents, and is costly.

In the model, heterogeneous agents partition themselves into different markets, and decide whether to use the courts, or the more expensive option of arbitration. Both the public good provided by the courts and the one provided by arbitration are endogenous, and respond to the different needs of the two classes of users. Changes in an exogenous productivity parameter alter both the formation of markets and the relative recourse to arbitration. The central idea is that traders' preferences over the legal system depend on their economic role, and change as the structure of the economy evolves. At the same time, the possibility to form coalitions providing a public good that is preferred to the national one allows individuals to engage into profitable transactions that would not take place otherwise. Thus the availability of arbitration influences the size of the markets, while at the same time the legal doctrine shaped by the arbitrators, and the recourse to arbitration by traders, both depend on the evolution of markets.

The model is an extension of the framework presented in Casella and Feinstein (1990), adapted to the particular example of arbitration. Arbitration has been studied by the economic literature, but always with a focus very different from the one than informs this paper. The literature analyzes the effect of an arbitrator on a bargaining game between two players with imperfect information, especially in the context of labor strikes (see for example Ashenfelter et al. (1992), or the July 1992 issue of *Industrial Labor Relations Review*). In this paper, on the contrary, there is no information problem, the precise dispute that the arbitrator must decide is not modeled, and arbitration is simply interpreted as a public good that favors trade and supplements the public good provided by the courts. The goal is to study the interaction between arbitration and the formation of markets, where arbitration is an example of a more general question of private coalition formation, in alternative to national policy. The model is based on rational individual behavior, but the emphasis is on economy-wide implications.

The paper is organized as follows. Section 2 discusses the provisions regulating international commercial arbitration, and describes how arbitration is administered

by the International Chamber of Commerce. Section 3 presents the model, section 4 its solution, and section 5 discusses the results. Final remarks in section 6 and an Appendix with analytical proofs and an extension of the model conclude the paper.

2. International commercial arbitration ²

2.1. *General provisions*

This paper studies arbitration between private individuals and ignores questions of arbitration involving governments.

“Arbitration is a device whereby the settlement of a question [...] is entrusted to one or more persons [...] who derive their powers from a private agreement, not from the authorities of a State, and who are to proceed and decide the case on the basis of such agreement” (David, 1985, p. 5). Its essential feature is that it arises from a free contractual agreement between the parties. Its regulation depends on the extent to which the state grants to the citizens the right to exclude themselves from the jurisdictions of its courts. If such right is not recognized, the state will not consider the award legitimate, and will refuse to lend its power to the enforcement of the arbitral decision. The history of arbitration law is the history of changing state attitudes with respect to this basic question.

Recourse to arbitration has been a common way of solving disputes since ancient times in all communities and legal systems. Traditionally however it was mainly a search for conciliation among parties destined to live together in small communities, not the recognition of a different jurisdiction. The arbitrator was chosen for his personal ties to the parties, and the award was not enforced by the courts. This was the legal status of arbitration in Roman law, for example, or in British law until the end of the 17th century. The more formal recognition of arbitration as something akin to a parallel judicial system correlates in history with the openness of society: it flourished at the international trade fairs of medieval Europe and under canon law, and it retreated during the age of the nation-state ideology in the 19th century.

There are several reasons why arbitration may be chosen, and they can be divided into three broad classes. First, the parties may prefer a more informal approach to their dispute than is required in court: arbitration is usually associated with less publicity than courts proceedings, and is seen as less contentious than litigation. Second, the parties may consider the law of the courts inappropriate, or out-of-date: this is an important motivation behind the choice of arbitration in

² The literature is naturally very large. The following sources were especially useful: Mustill and Boyd (1987) for British law, David (1985) for a comparative approach, and Craig et al. (1990) for the description of the International Chamber of Commerce, and a careful summary of the practice of international arbitration. Chapter 29 in Mustill and Boyd and chapter 4 in David present concise histories of arbitration.

commercial disputes, where the judge is often seen as less competent and reliable than an arbitrator familiar with the 'usages of the trade'. Finally, arbitration is considered particularly useful in international cases, because national laws may differ substantially among themselves, in contrast to widely recognized international business customs, and because courts decisions are often more difficult to enforce abroad than arbitration awards.

In many countries the legal status of arbitration has undergone great changes in the last few years, moving towards wider acceptance, reduced court interference during the proceedings and simpler and stricter rules for the enforcement of the arbitration award. England passed the Arbitration Act in 1979, France issued two decrees on arbitration in 1980 and 1981, Italy had a new law in 1983, the Netherlands and Portugal in 1986, Switzerland in 1987, Spain in 1988. Legal scholars agree that the enhanced status of arbitration responds to the needs of increased trade, and international trade in particular: "The expansion of commerce, the development of international relations and the multiplicity of technical problems [...] have led the courts to adopt an attitude of [...] positive support" (Bellet, 1980). Or: "Usages in the world of international commerce may frequently develop more rapidly than the law" forcing wider acceptance of arbitration (Craig et al., 1990, p. 294).

Since national regimes differ, summarizing arbitration law is difficult. However, if attention is limited to Western industrialized countries, the following general principles emerge. The arbitration agreement is recognized as long as the object of the arbitration is a right of which the parties are qualified to dispose. In other words, the dispute cannot center on issues of public interest (for example, disputes falling under family law cannot be arbitrated). In commercial matters, the agreement to arbitrate can be concluded either after the dispute has arisen, or before, and form part of the original contract. The parties can specify the law that should regulate the dispute, or leave the decision to the arbitrator. Once the arbitrator has rendered the award, if the loser does not comply voluntarily, the winning party can have the award declared enforceable by the courts. The courts will limit themselves to a purely formal control, verifying that an agreement to arbitrate exists, that the appointment of the arbitrator has been made according to such agreement and that the award satisfies the formal requirements established by national law. The losing party can appeal against the arbitral award only in few circumstances: if the agreement to arbitrate is void or invalid, if the arbitrator has exceeded his power, or if the arbitration process has not been conducted according to a fair procedure. Traders do not want arbitration to be the first step of a long legal battle; responding to their pressure, courts everywhere have moved to reduce the room for appeal. In general neither a claim that the arbitrator has misinterpreted the facts, nor evidence that he has not followed the law invoked in the proceedings are ground for appeal. In practice, this gives the arbitrator wide leeway in the choice of the principles inspiring the award. In several countries, the parties can agree to waive the right of appeal as part of their original contract.

To what extent does international arbitration give rise to a legal system that differs from national laws? It is clear that the enforcement power is lent by the national courts, and the latitude allowed to arbitration depends on explicit provisions made by the law-makers or the courts. Presumably the currently liberal legislation would be revoked if there were perceptions of abuse. On the other hand, within these limits the arbitrators have remarkable autonomy. Since the courts will not set aside an arbitral award because of errors of law, with increasing frequency arbitrators invoke ‘the usages of the trade’, or explicitly refer to an international *lex mercatoria* in justifying their decisions.³ The provisions allowing traders to renounce *ex ante* their right of appeal confirm the willingness of the courts to accommodate the demands of commerce, and accept arbitration as an alternative judicial system. In addition, in the last few years the large arbitral institutions have begun to publish a selection of the arbitral awards rendered under their supervision. These are rapidly acquiring the role of precedents, invoked in successive decisions and giving concrete and up-to-date content to the abstract concept of *lex mercatoria*.⁴ Taking these arguments into account, scholars conclude that in international commercial arbitration the enforcement power is lent by the courts, but the legal doctrine is chosen and perfected by the traders, the international members of the arbitration ‘club’: ‘The result is a legally binding resolution not founded on a specific national proper law’ (Craig et al., 1990, p. 297).

A recurrent theme in the literature on arbitration is the distinction between domestic and international arbitration. In most legal regimes the courts exercise a looser control on international arbitration, following the principle that possible conflicts between national laws justify the recourse to arbitration. Relinquishing the monopoly of the judicial system is more controversial in the case of domestic disputes, where both parties are unequivocally subject to the same set of laws. Thus, for example, British law recognizes the right of the parties to waive future appeals against arbitral awards only in the case of international disputes. Similarly, French, Italian and United States laws make explicit exceptions for international arbitration, allowing more latitude in both procedure and substance, and curtailing the room for appeal.⁵

A second reason to distinguish between international and domestic arbitration is that different factors are believed to be responsible for their developments. While the literature is unanimous in identifying markets integration as the engine for

³ Fouchard in Fouchard et al. (1982) analyzes a series of cases in which French courts decided to enforce the award even though the arbitrator had stated explicitly his recourse to *lex mercatoria*, in contrast to national law. This is particularly remarkable because French decrees on arbitration require that the arbitration decision be rendered according to principles of law.

⁴ See the discussion in Craig et al. (1990, chapter 35), and the papers by Jakubowski and by Lew in Schultsz and van den Berg (1982).

⁵ See Schmitthof in Schultsz and van den Berg (1982) and Craig et al. (1990, chapter 28).

arbitration in international matters, recourse to arbitration in domestic disputes is motivated by forces largely idiosyncratic to the specific systems.⁶ In particular, the development of domestic arbitration is usually linked to the congestion of the courts and to the lower cost of arbitration. In contrast not even arbitration centers invoke these two factors in favor of international arbitration: they recognize that proceedings are usually complex and can be lengthy, and that the costs are typically higher than they would be in national courts (see Craig et al., 1990).

The expansion of international arbitration requires that the courts be willing to enforce awards rendered in a foreign country, and depends on a complex set of bilateral treaties and multilateral international conventions. Among the latter, the most important is the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards. Signatories to the Convention agree to recognize arbitral awards rendered in another country, subject in general to a reciprocity condition. As of June 1989, 83 countries had ratified the Convention, including the United States, Japan and almost all of Europe. The New York Convention played an important role in increasing the volume of cases referred to international arbitration, and the large number of signatories is in itself a sign of the current popularity of arbitration.⁷

2.2. Institutional arbitration and the International Chamber of Commerce

Arbitration can be ad hoc – organized by the parties outside the aegis of any particular institution – or can be administered by an arbitration center. In each country, several dozens trade associations provide arbitration services to their members. In the 20th century, a number of institutions have been formed or have modified their statutes to deal explicitly with commercial international arbitration, expanding their scope beyond national borders and the limits of a specific trade.

⁶ See for example David (1985) or the papers collected in Sanders (1967), Schultsz and van den Berg (1982), and Fouchard et al. (1982). There are large differences across countries in what are considered legitimate matters for domestic arbitration. For example, the German tradition is very favorable to arbitration, but labor disputes cannot be arbitrated (i.e. the decision is not enforceable). Similarly, arbitration clauses giving the right to appoint arbitrators to only one party are void. (Schwab in Sanders, 1967). In the United States these clauses are common, for example in insurance contracts where the buyer simply signs a standard form. Disputes arising from contracts of this type and labor disputes constitute a major share of all domestic arbitration cases in the U.S. (American Arbitration Association, personal communication.)

⁷ Among European countries, the exceptions were Albania, Iceland, Malta and Portugal. Judicial decisions are also object of international conventions. With respect to commercial disputes the most important of these is the 1968 Brussels Convention on Jurisdiction and the Enforcement of Judgments in Civil and Commercial Matters, which however is limited to the countries of the European Union. The unanimous opinion is that international treaties have been remarkably ineffective in the case of litigation. (See for example David (1985, p. 17): “There is a strong possibility that a judgment given by the courts of a given state should be unenforceable outside the territory of the state”.)

Although it is impossible to know the magnitude and the details of ad hoc arbitration, we can study the rules under which international arbitration institutions provide their services. The rules of the most important of these institutions have become standard reference in all international arbitration, and their influence extends well beyond the number of cases directly administered within their arbitration tribunals. This section describes the International Chamber of Commerce (ICC) in Paris, the largest and most active of the international arbitration institutions.⁸

According to its own description, ICC is “an association of internationally oriented enterprises, and their national organizations, [whose purpose is to] promote international commerce world-wide”. In 1989, it represented approximately 7,164 enterprises and organizations, in 114 countries.

The ICC was founded in 1919. Four years later, its Court of Arbitration was created “by businessmen who wrestled with the practical difficulties of designing a dispute resolution process acceptable to merchants of different national backgrounds” (Craig et al., 1990, p. XXI). By statute, its scope is limited to international commercial disputes. The Court supervises the arbitration process, and appoints the arbitrators if the parties have not done so. The members of the Court are nominated by the National Committees established by the enterprises participating in the ICC.

Initially, ICC awards were not legally enforceable, but after the New York Convention of 1958 the volume of cases submitted to the ICC arbitration court has expanded substantially. By September 1990, it had received a total of 7,000 requests for arbitration, half of which since 1978. Fig. 1 reports the number of requests for international commercial arbitration received each year by the ICC and, for comparison, by the American Arbitration Association, the second largest institution in terms of volume of international cases. These numbers represent actual disputes, a small percentage of all agreements providing for institutional arbitration. A comparison with the number of international commercial cases submitted to national courts each year is impossible, since statistics are not available. Only collections that explicitly discuss the courts’ decisions distinguish between domestic and international commercial cases; the more detailed of these collections do not mention more than 15 or 20 cases per year in any single country.⁹

⁸ The 1989 Columbia University Guide (Columbia University School of Law, 1989) provides a synthetic and up-to-date review of the major international arbitration institutions.

⁹ International arbitration institutions have begun to collect and publish statistical data only recently. The ICC publishes its own *Bulletin*, twice a year, and presents summary data in each year’s last issue of the *Journal du droit international (Clunet)*. The American Arbitration Association publishes *Arbitration and the Law*, its annual report on the activity of the previous fiscal year. Data on other institutions are made available less systematically. For extensive reviews of courts decisions in disputes involving international contracts, see, for example, Langen (1973) or Delaume (1992).

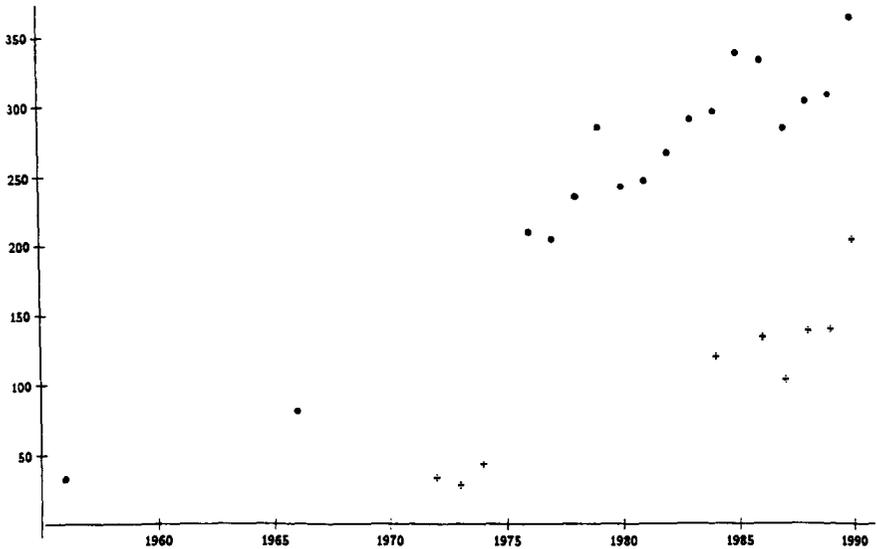


Fig. 1. Requests for international arbitration. ICC and AAA, per year.

● ICC, + AAA.

Sources: ICC: Craig et al. (1990), *Journal du droit international* (Clunet), various issues. AAA: *Arbitration and the Law*, various issues, personal communication.

The major drawback of ICC arbitration is its cost, as recognized by the ICC itself. Parties pay a preliminary estimate of the total cost, including administrative expenses and the fees of the arbitrators, when presenting the dispute. Arbitrators' fees are proportional to the amount in dispute, but with sharply decreasing proportions, as detailed in a table prepared and published by the ICC. For example, for a claim of \$1,000,000, the maximum cost for three arbitrators is \$104,500; for a claim of \$100,000,000, it is \$614,500 (Tables 9a and 9b in Craig et al. (1990, pp. App. I-17, 18)). These costs do not include lawyers' fees and usual legal expenses, and make ICC arbitration in general too expensive for the settlement of small claims. Indeed, since 1985, 50 per cent of all cases have involved amounts in excess of \$1,000,000, and approximately 10 per cent amounts above \$10,000,000. In practice the high cost of arbitration is common to all international centers, and the literature agrees that small cases should be referred to national courts. (See for example Glossner in Schultsz and van den Berg (1982)).

3. The model

The model studied in this paper is an extension of the framework discussed in Casella and Feinstein (1990). The main idea is that public goods are important for

efficient trade, but individuals' preferences over the public goods are not homogeneous: they are determined by agents' relative positions in the market. Therefore, when markets expand, the coalitions that agents form for choosing and sharing the public goods are also affected. The change in these coalitions leads to a change in the chosen level of the public goods, feeding back into agents' sorting into different markets. In equilibrium, markets and public goods coalitions are determined together: trade influences the formation of jurisdictions, and the partition into jurisdictions shapes the public goods necessary to support private trade, and thus the formation of markets.

International arbitration can be studied from this perspective, as an example of a new jurisdiction evolving together with the expansion of international trade.¹⁰

The world is composed of a continuum of traders, whose endowments are distributed uniformly along a line from -1 to 1 . If i is the endowment of trader i , then:

$$i \sim U \text{ over } [-1, 1]. \quad (1)$$

There are two identical countries: country 1 comprises traders from -1 to 0 , and country 2 from 0 to 1 , implying that on average endowments are more homogeneous within each country than across countries. Traders sort themselves into different markets. A market is defined as a set of individuals who engage in bilateral exchange, and markets' composition is not given, but will be determined in equilibrium. A market in this model is a generic set of points belonging to the interval $[-1, 1]$.

When a trader enters a market, he is randomly matched with a partner from the same market, and his return depends on the two endowments, on an index of productivity and on the legal system he has access to. The return from a match between traders i and j is described by:

$$y_{ij} = z_{ij}(\beta d - z_{ij}) - t \quad (2)$$

where z_{ij} is the Euclidean distance between the two endowments ($|i - j|$), d represents the legal system, t are lump-sum taxes per capita necessary to finance it, and β is an exogenous productivity parameter. A larger d is meant to capture a more efficient and better functioning legal system.

Eq. (2) reflects the intuition that trade benefits from a legal system through which contracts are enforced. The more reliable and predictable the set of rules – the higher is d – the higher is the expected return from all exchanges. In the absence of a publicly provided legal system, traders would have to rely on private

¹⁰ Arbitration offers individuals an extra option, in addition to the judgments they can obtain in their national courts. The existence of this second possible source for the public good is not modeled in Casella and Feinstein (1990). Economides and Siow (1988) discuss a model of market formation similar to the one analyzed here and in Casella and Feinstein (1990), but where there are no public goods.

enforcement, mainly through the effects of reputation. While reputation forces may be effective in thin, non-anonymous markets, they become increasingly difficult to enforce and eventually ineffective as markets grow (see Milgrom et al. (1990) and Greif et al. (1991)).

The specification of Eq. (2) has two main features. First, it says that each trader has an ideal partner at distance $\beta d/2$. Thus the model recalls ‘ideal-variety’ models with one important difference: the location of the optimal partner is not exogenous but depends on the reliability of the legal regime and on the parameter β . Partners that are ‘too far away’, partners that are engaged in activities that are too difficult to monitor privately, will not be a desirable match when the legal system is unreliable, but may well become desirable at larger d , or larger β . Since each trader’s desire to join a specific market depends on the probability of meeting productive partners, Eq. (2) implies that small markets are advantageous at low levels of productivity, and with primitive legal systems, but break down when a sufficient legal basis has been created to allow more ‘distant’ partnerships. At higher β , and d , markets integrate and become progressively larger.

Second, the value of an efficient legal system is not the same for each trader in a given market: it depends positively on the expected distance between him and a partner. This expected distance is highest for individuals close to the edges of the market, and lowest for those located in the middle. In other words, traders located near the edges have higher potential productivity, but need a more reliable or more sophisticated legal system than traders in the middle: each individual’s role in the market, captured by his position, determines his tastes over d .

Thus the simple structure of the model captures the intuition that traders’ ideal legal rules differ. So for example, efficient liability laws are different in the case of mature products or of new technologies. More closely related to the topic of this paper, firms producing mainly for domestic markets are more concerned with improving the administration of justice at home than they are with problems of conflict of law in international transactions. In the model, these differences are represented (a bit roughly) by preferences over different levels of d . Notice that while traders can choose the market they join, within a market they are matched randomly with a partner. The assumption of random matching is not completely satisfactory, but it generates very simply heterogeneous preferences over d within the symmetrical structure of the model.

The parameter β represents the productivity of the legal system that is common to all matches: an increase in β increases the efficacy of d in all partnerships, and increases the desired distance between partners for all levels of d . Thus I think of β as summarizing all other determinants of the productivity of the legal system not explicitly introduced in the model: the transmission of information, for example, or the establishment of social norms, or the likelihood of enforcement. Because β is common to all matches, it captures underlying characteristics of the whole economy.

The courts provide legal enforcement and a body of laws to all citizens, and are

financed through the lump-sum taxes t . The higher the level of the taxes, the larger the number and the quality of the judges, and the more rapid and efficient the provision of legal services, all factors that translate here into a higher level of d . Resources collected from individuals can be immediately transformed into higher d . This relationship is given by

$$d = t^\alpha, \quad \alpha < 1, \quad (3)$$

where the cost of producing d is assumed independent of the size of the population.¹¹ To simplify the algebra, α is set equal to 1/2, but the specific value of the parameter will not affect the qualitative results of the model.

Each individual can join only one market. In general we need not put restrictions on the number or location of the markets that arise in equilibrium. For the purposes of this paper, however, I will concentrate on equilibria with three markets: two domestic markets, one in each country, formed exclusively by domestic citizens, and one international market, where traders from both countries can meet.

In the two domestic markets, all transactions are regulated by national courts, and pre-tax returns are described by Eq. (2). In the international market, after matching has occurred international partnerships have two options: they can rely on the national courts, or they can decide to use arbitration. If they rely on the courts, their return is again described by Eq. (2), where d represents for each trader the legal services provided in his country. If the traders decide to use arbitration, they have access to legal services d_a , and pay the additional cost t_a . Since national taxes t must always be paid, their return after arbitration is given by

$$y_{ij} = z_{ij}(\beta d_a - z_{ij}) - t - t_a. \quad (4)$$

Arbitration services are produced from arbitration fees, according to the same production function characterizing the functioning of the national courts:

$$d_a = t_a^\alpha \quad (5)$$

where again α is set equal to 1/2.

A more general model would allow for the use of arbitration in domestic transactions and at the same time capture the reduced effectiveness of national courts in international deals. What matters is the recognition that arbitration plays a larger role in international transactions than it does in domestic ones. Assuming that arbitration is only available to international matches is the simplest way of making the point. Adding to the model the imperfect functioning of the courts in international disputes is straightforward and strengthens the results of the paper. This extension is discussed in the appendix.

¹¹ The assumption seems appropriate when discussing the functioning of the courts, with their high risk of congestion, but can easily be weakened.

The two legal systems, d and d_a , are decided before economic transactions take place. The courts' legal provisions d maximize expected per capita income of each country's citizens, while arbitration services d_a maximize expected per capita income of traders in the international market. While everybody engaged in an international transaction may eventually decide to use arbitration, d_a is chosen *ex ante*, weighing more heavily the needs of its most likely users. Both this feature and the international character of the 'arbitration club' are designed to capture the role of international traders associations in organizing arbitration rules and courts.¹²

Finally, the use of arbitration is possible only if allowed by the national courts, since they retain the ultimate enforcement power. The courts will support arbitration only if its existence leads, in equilibrium, to higher welfare for the citizens of the country overall, as measured either by average expected per capita income or by approval by a majority of the country's citizens.

The order of moves is the following: first d and d_a are chosen, then agents enter a market, are matched, choose a legal regime and trade. The model will be solved for perfect foresight Nash equilibria. In equilibrium, the location of the three markets, the levels of d and d_a , and their expected use are determined so that, given the realized levels of d and d_a and the partition into markets, no trader wants to deviate to a different market, and given the choice of markets and of legal regimes, d and d_a maximize average expected per capita incomes of the relevant groups.

3.1. *Solution of the model*

Let us first solve the model when traders can only use national courts. We must begin by identifying the composition and the size of the three markets in equilibrium. When all disputes must be settled by the courts, Proposition 1 in Casella and Feinstein (1990) applies directly. It demonstrates that in equilibrium two results must hold: first, each market must be formed by a connected set of traders; second, all three markets must have identical size. The first result follows from the choice of functional form in Eq. (2): if traders at the edges of a segment of the line find profitable entering into one market, then all traders in between will also want to join the same market. The second result comes immediately from

¹² In an alternative specification, international traders could pay a fixed cost to enter an 'arbitration club' before matching occurs. The members would then choose d_a , which would be available to them only. This assumption seems less faithful to the practice of arbitration, but would have no important effects on the results. Notice that in reality there is an asymmetry between the cost of the courts and the cost of arbitration, since the latter is incurred only in the case of a dispute. However, since all the analysis is conducted *ex ante*, the specification discussed in the text is equivalent (up to a constant) to assuming an identical probability of dispute in all matches. Generating such probability endogenously would be interesting, but is best done in a different type of model.

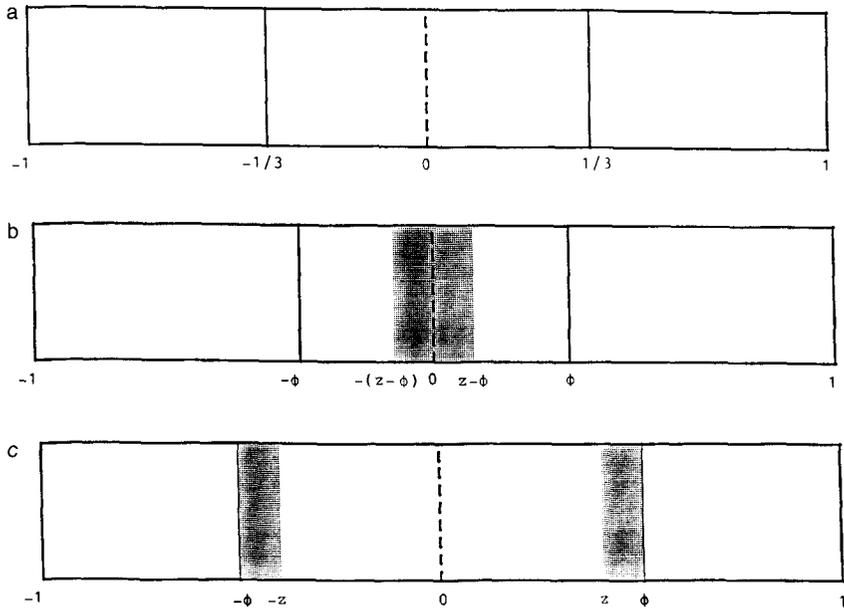


Fig. 2. Equilibrium derivation into three markets.

2a: The courts-only case.

2b: Arbitration and the courts, $z > \phi$. Traders in the shaded area never use arbitration.

2c: Arbitration and the courts, $z < \phi$. Traders in the shaded area use arbitration with all foreign partners.

noticing that in equilibrium the individual located at the border between two markets must be indifferent between joining either of them. If each market is a connected segment and there is no difference between the legal services available to the trader in the two cases, then the markets must have the same size.¹³

Therefore if an equilibrium with three markets exists the two domestic markets must be formed by traders in the interval $[-1, -1/3]$, in country 1, and $[1/3, 1]$ in country 2; the international market must be formed by traders immediately on the two sides of the border, between $-1/3$ and $1/3$. (See panel a of Fig. 2).

The two countries will be mirror images of each other, and we can concentrate on country 1 alone. Consider trader i belonging to the domestic market in country 1, i.e. $i \in [-1, -1/3]$. When he enters the market, he is matched randomly with a partner, and his expected return is

$$E y_i(j \in [-1, -1/3], d) = 3/2 \left[\int_{-1}^{-1/3} z_{ij} (\beta d - z_{ij}) dj \right] - t \quad (6)$$

¹³ See Casella and Feinstein (1990) for the formal proof.

where d are the legal services provided by the courts (and t the taxes necessary to finance them), and $3/2$ is the constant that normalizes to 1 the total mass of individuals over the interval.¹⁴

In equilibrium, individual i must prefer the domestic market in country 1 to the international market:

$$E y_i(j \in [-1, -1/3], d) - E y_i(j \in [-1/3, 1/3], d) \geq 0$$

$$\forall i \in [-1, -1/3]. \tag{7}$$

The difference in expected returns in the two markets comes from the difference in expected distance from a partner. Condition (7) always holds with equality when evaluated at $i = -1/3$: the individual at the border between two markets of equal size is indifferent between them. But (7) must hold for all $i \in [-1, -1/3]$. Therefore we must require that the left-hand side of (7) be at a minimum at $i = -1/3$. It is not difficult to show that this demands:¹⁵

$$\beta d/2 \leq 1/3. \tag{8}$$

To understand the meaning of condition (8), and to complete the solution of the model, we need to determine the optimal value of d . Average expected per capita income in country 1 is:

$$E y = \int_{-1}^{-1/3} E y_i(j \in [-1, -1/3], d) di$$

$$+ \int_{-1/3}^0 E y_i(j \in [-1/3, 1/3], d) di \tag{9}$$

or, solving the integrals:

$$E y = \frac{2}{9} \beta d - \frac{2}{27} - t. \tag{10}$$

Substituting (3) in (10), and maximizing with respect to d , we find

$$d = \beta/9. \tag{11}$$

Therefore (8) implies

$$\beta^2 \leq 6. \tag{12}$$

At higher β values, traders find the size of their local market too small, and,

¹⁴ The explicit algebraic expression is easily derived, once we notice

$$\int_a^b [z_{ij}(\beta d - z_{ij})] dj = \beta d \int_a^i (i - j) dj + \int_i^b (j - i) dj - \int_a^b (j^2 + i^2 - 2ij) dj.$$

¹⁵ Note: (1) The condition is identical if derived from the point of view of a trader in the international market considering deviation to the domestic market; (2) Ruling out deviation to the neighboring market is sufficient to insure that entering the market further away would be unprofitable.

looking for more distant partners, jump to the neighboring market, upsetting the equilibrium. If β is larger than 2.45, all traders must be together in one single market.

The equilibrium with three markets is now completely characterized. The three markets are contiguous and have identical size. Eq. (11) yields d , and condition (12) must be satisfied.

Solving the model when recourse to international arbitration is allowed is slightly more complex, but follows the same logic. The first step is identifying the location of the three markets. If in equilibrium any international transaction is still regulated through the national courts, then there exists a unique equilibrium partition where each market is formed by a connected segment of traders. Since everybody has access to the courts, if the national legal system supports trade between two individuals, then any other individual located between them will also want to join the same market, exactly as in the case studied above. This is the equilibrium I study in what follows, where part of the international transactions rely on the national courts.

Because recourse to arbitration is allowed only in the international market, the three markets will not have the same size. Therefore the two domestic markets are formed by traders between -1 and $-\phi$, in country 1, and between ϕ and 1 in country 2, and the international market by traders between $-\phi$ and ϕ .¹⁶

As before, focus on country 1. Expected return for traders in the domestic market ($i \in [-1, -\phi]$) is

$$E y_i(j \in [-1, -\phi], d_c) = 1/(1 - \phi) \left[\int_{-1}^{-\phi} z_{ij} (\beta d_c - z_{ij}) dj \right] - t_c \quad (13)$$

where d_c is now the legal system provided by the courts (and t_c the per capita tax financing it).

In the international market, traders who have been matched and belong to two different countries can decide whether to use arbitration, and pay for it, or rely on the courts. Since the courts are always available at no extra cost, nobody will ever choose arbitration if it does not provide more efficient services. In equilibrium, therefore:

$$d_a > d_c. \quad (14)$$

¹⁶ Two remarks: (1) If *all* international trade takes place through arbitration, other equilibria are possible. These are equilibria where highly productive traders located near the edges of the endowments distribution decide to finance and benefit from a very efficient arbitration system. They can then engage in international trade at distances that are too large for reliance on the national courts, and at arbitration costs that are too high for the less productive traders located closer to the center of the distribution. (2) In the equilibrium studied in the text, since arbitration is available in the international market only, the three markets are not equivalent and in general will not have the same size. (See Proposition 2 in Section 5.)

Comparing Eqs. (2) and (4), we see that by using arbitration, international traders i and j increase their return by $\beta(d_a - d_c)z_{ij}$, but must then pay arbitration costs t_a . Therefore there is a distance z at which two partners are indifferent between arbitration and the courts, where z solves the equation

$$\beta(d_a - d_c)z - t_a = 0. \quad (15)$$

International matches at distance larger than z will always use arbitration, and matches at distance smaller than z will use the courts. Notice that if $z \geq 2\phi$, nobody ever uses arbitration, and we return to the case analyzed at the beginning of this section. What follows holds for $z < 2\phi$.

Suppose first $z \geq \phi$. Then for traders close to the center of the international market (i.e. $i \in [-(z - \phi), (z - \phi)]$), all matches will be at distance smaller than z : they will never use arbitration (panel b of Fig. 2). Recall that traders at the center of a market are the least potentially productive, or, equivalently, the ones who need less sophisticated legal protection. Since arbitration is expensive, there will be equilibria where some traders will never recur to it.

Consider trader i from country 1 belonging to the international market ($i \in [-\phi, 0]$). His expected return is:

$$\begin{aligned} E y_i(j \in [-\phi, \phi], d_c, d_a) = & (1/2\phi) \left\{ \int_{-\phi}^{i+z} [z_{ij}(\beta d_c - z_{ij})] dj \right. \\ & \left. + \int_{i+z}^{\phi} [z_{ij}(\beta d_a - z_{ij}) - t_a] dj \right\} - t_c. \end{aligned} \quad (16')$$

The equilibrium value for ϕ is determined by the condition that the individual located exactly at $-\phi$, at the border between the domestic and the international market, be indifferent between the two markets. Setting (13) equal to (16'), with both equations evaluated at $i = -\phi$ yields an implicit equation for ϕ :

$$\begin{aligned} \beta d_a(4\phi^2 - z^2) + \beta d_c[(\phi - 1)2\phi + z^2] + \frac{4\phi(1 - 2\phi - 3\phi^2)}{3} \\ - 2t_a(2\phi - z) = 0. \end{aligned} \quad (17)$$

In addition, the requirement that the temptation to deviate to the neighboring market be maximum for the trader at the border between the two markets implies that the following condition must be satisfied:¹⁷

$$2\phi\beta(d_a + d_c) \leq 2\phi(1 + \phi) + t_a. \quad (18)$$

As before, if (18) is violated the equilibrium unravels, as traders jump to the market next to theirs.

¹⁷ Condition (18) is necessary and sufficient if $(1 - \phi)(d_a - d_c) \leq 4\phi d_c$. Eqs. (15), (17) and (19) imply that this inequality must be satisfied in all equilibria.

The arbitration services d_a are determined so as to maximize average expected per capita income of all potential users. Expected returns to citizens of country 2 in the international market mirror expected returns for citizens of country 1, and we can focus on the latter alone. Because individuals in the interval $[-(z - \phi), 0]$ never use arbitration, we integrate (16') over $i \in [-\phi, -(z - \phi)]$. Maximizing with respect to d_a , we find

$$d_a = \frac{\beta(\phi + z)}{3}. \tag{19}$$

Finally, d_c maximizes average expected per capita income over all citizens of country 1. Integrating (13) and (16') over i in the appropriate intervals, and maximizing the result with respect to d_c we obtain

$$d_c = \frac{\beta}{12\phi} [2\phi(1 - \phi)^2 + z^2(3\phi - z)]. \tag{20}$$

In the case $z \geq \phi$, the equilibrium is now completely characterized. The international market extends from $-\phi$ to ϕ , while traders to the two sides of it form in each country a purely domestic market. In the international market, matched partners use arbitration if the distance between them is larger than or equal to z . The system of four equations (15), (17), (19) and (20) determines ϕ and z , along with d_a and d_c . In addition, condition (18) must be satisfied.

Suppose now $z < \phi$. The model can be solved along similar lines. If z is smaller than ϕ , traders located at the edges of the international market (i.e. $i \in [-\phi, -z]$, in country 1, and $i \in [z, \phi]$ in country 2) use arbitration in all international matches (panel c of Fig. 2). The expected return of a trader in the international market from country 1 ($i \in [-\phi, 0]$), is

$$\begin{aligned} & E y_i(j \in [-\phi, \phi], d_c, d_a) \\ &= (1/2\phi) \left\{ \int_{-\phi}^{\max(0, i+z)} [z_{ij}(\beta d_c - z_{ij})] dj \right. \\ & \quad \left. + \int_{\max(0, i+z)}^{\phi} [z_{ij}(\beta d_a - z_{ij}) - t_a] dj \right\} - t_c. \end{aligned} \tag{16''}$$

As before, we determine ϕ from the requirement that the trader between the domestic and the international market must expect equal income from joining either market. Setting (13) equal to (16''), with both equations evaluated at $i = -\phi$, we find that ϕ must solve

$$3\phi\beta d_a + \beta d_c(3\phi - 2) + \frac{4(1 - 2\phi - 3\phi^2)}{3} - 2t_a = 0. \tag{21}$$

No other trader will want to change market if and only if

$$\beta d_a + 3\beta d_c \leq 2(1 + \phi). \tag{22}$$

Finally, the optimal levels of d_c and d_a are:

$$d_c = \frac{\beta}{12} \left(3\phi^2 + 2 - 4\phi + \frac{z^3}{\phi} \right) \quad (23)$$

and

$$d_a = \frac{\beta(3\phi^3 - z^3)}{6\phi^2 - 3z^2}. \quad (24)$$

In conclusion, when $z < \phi$, in equilibrium z , ϕ , d_c and d_a solve the system of equations (15), (21), (23) and (24), and condition (22) must be satisfied.

4. Results

The equations characterizing the equilibria with arbitration do not give rise to simple closed-form solutions. However, several properties of these equilibria can be derived analytically and are summarized in the following propositions. Propositions 1 and 2 stress the relationship between the economic structure and the provision of legal services. Proposition 3 studies the effect of the introduction of arbitration on the provision of legal services by the courts.

Proposition 1. Changes in the productivity parameter β do not affect the relative use of arbitration directly. They do affect it through the implied changes in markets' size; i.e. $dz/d\beta = z^\phi d\phi/d\beta$, where the superscript indicates the partial derivative.

This conclusion follows immediately from Eq. (15), substituting t_a from (5), and the equilibrium levels of d and d_a (Eqs. (19) and (20), or (23) and (24)). The intuition is simply that at higher β the increased attractiveness of arbitration, coming from an increase in its marginal productivity, is exactly matched by its increased cost. If the division into markets remained unchanged, the partition of individuals between those choosing arbitration and those referring to the courts would also remain unchanged. In other words, it is the change in markets structure that leads some traders to modify their choice of legal system.

The result is important because it stresses that expansion of trade per se triggers changes in individuals' alliances to different coalitions, even in a simplified world where no direct link exists between the productivity parameter and the choice of the public good.¹⁸

¹⁸ Proposition 1 does not depend on the value of the parameter α . A direct link between β and z could be inserted in the model for example by including fixed transaction costs when using the courts in international deals. The point of the proposition is that even in the absence of such a link z responds, in equilibrium, to changes in β .

Proposition 2. In all equilibria with arbitration the international market is larger than it would be with exclusive reliance on the courts, i.e. $\phi > 1/3$.

Proof. See the appendix.

Again, the intuition is straightforward: Since arbitration is expensive, it will be used in partnerships of high potential productivity requiring especially efficient provision of legal services. These ‘high-distance’ matches, involving traders near the edges of the international market are exactly those that cannot profitably rely on the courts, and therefore would not be in the market if arbitration were not available.

Proposition 2 is the counterpart of Proposition 1. As market forces affect the decision to recur to arbitration, so the existence of arbitration influences the economic structure by modifying the partition into markets. A purely economic choice – the decision to join a specific trading pool – is influenced directly by the availability of a public good.¹⁹

Proposition 3. In all equilibria with arbitration, (a) the level of arbitration services is higher than the level of legal services that would be provided in the courts-only case, i.e. $d_a > d$; (b), the level of legal services provided by the courts is lower than it would be without arbitration, i.e. $d_c < d$.

Proof. See the appendix.

Proposition 3 follows from the same intuition discussed above: arbitration is targeted to particular, high productivity trades. Since partnerships with large legal needs refer to arbitration, the legal services provided by the courts can be reduced. Therefore arbitration provides a mechanism for selecting traders according to their needs for legal services, and satisfies, in part, their heterogeneity.

Part (b) of Proposition 3 confirms a concern often voiced by judges and scholars wary of arbitration: the fear that it may deprive the courts of “access to a wide variety of disputes, . . . [necessary] to develop a detailed and up-to-date law of commerce” (Mustill and Boyd (1987, p. 404), referring to opponents of the 1979 English Arbitration Act).²⁰ In the model, the partnerships recurring to arbitration

¹⁹ Without arbitration, the borders of the international market are fixed at $-1/3$ and $1/3$ for all values of β consistent with the three-market equilibrium. This is for simplicity only. The model can be easily modified to include an expanding international market (again, inserting fixed transaction costs in international exchanges is one way). It would remain true that allowing arbitration results in a larger international market, for all β .

²⁰ Similarly, The Economist worries that by preventing the evolution of the courts, arbitration may leave traders in smaller deals without a reliable and efficient legal system: “There is a risk that valuable democratic institutions will erode further” (*The Economist*, 7/18–24/1992, p. 18 of the survey on the legal profession).

are those in which the legal public good has higher productivity, and who therefore are willing to pay a premium for a better legal system. In the real world these partnerships are likely to be those with more complex and innovative cases, and the courts will be missing exactly those disputes that are essential to keeping jurisprudence current.

How do the endogenous variables of this model respond to changes in the productivity parameter β ?

The equilibrium with national courts only is very simple, and its comparative statics properties immediately clear. The provision of legal services d rises linearly with β , while the division between domestic and international market remains unchanged, until the level of β reaches 2.45, and the three-market equilibrium unravels.

When arbitration is considered, the equilibria are more complex. I have run a series of numerical simulations, and found that the highest value of β compatible with a three-market equilibrium is $\beta = 2.16$. (Notice that integration to a unique market occurs at lower productivity levels in the presence of arbitration). For values of β smaller than 2.14, the equilibrium is unique. For β between 2.14 and 2.16, a second unstable equilibrium appears. Given its fragility I ignore it in what follows, limiting its discussion to footnotes.

At low values of β , z is larger than ϕ , and the solution of the model is given by Eqs. (15), (17), (19), and (20). Vice versa, for larger β values, the equilibrium requires z smaller than ϕ , and the solution is given by Eqs. (15), (21), (23), and (24). The transition between the two regimes takes place at β equal 1.85. The order of the two regimes is not surprising: at low β values, the importance of more efficient legal services is also low, and traders located in the middle of the international market forgo the expensive option of using arbitration. In this situation, the minimum distance between partners choosing arbitration is larger than ϕ . On the other hand, when β is larger, everybody in the international market expects to use arbitration profitably in at least some of his international partnerships: this corresponds to the second regime, where z is smaller than ϕ .

Fig. 3 depicts ϕ and z as functions of β . At low β values, the option of using arbitration is relatively unimportant, and ϕ , the half size of the international market, is very close to $1/3$. The international market is only slightly larger than it would be without arbitration. However, as β rises, d_a rises too, and the international market expands rapidly, while the domestic market contracts. At low values of β , z is larger than ϕ and falls as β rises. In this interval, the value of using arbitration rises more than its cost, and arbitration becomes increasingly widespread, not only because of changes in market size, but because it becomes a profitable option for matches who would not have used it at lower β . However, after β has reached the point where all international traders consider the use of arbitration, z begins to rise. The reason is that the international market has continued to expand, and the level of arbitration services is now large. Recurring to arbitration becomes increasingly expensive, and some partnerships who were

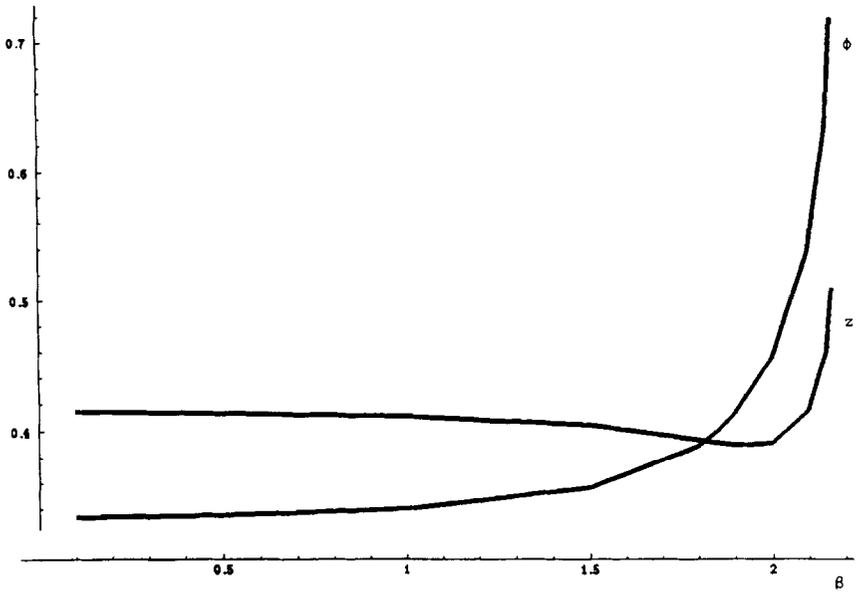


Fig. 3. Size of the international market. Minimum distance between partners using arbitration.

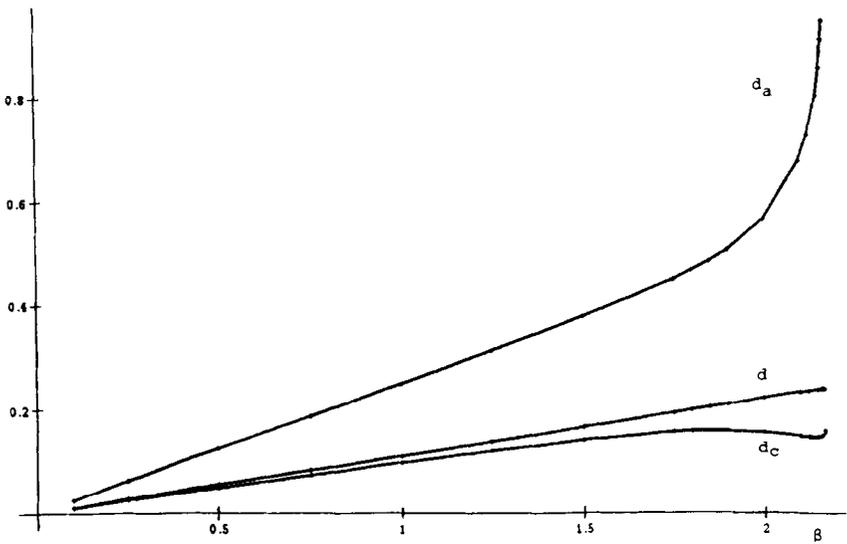


Fig. 4. Provision of legal services. Arbitration and the courts.

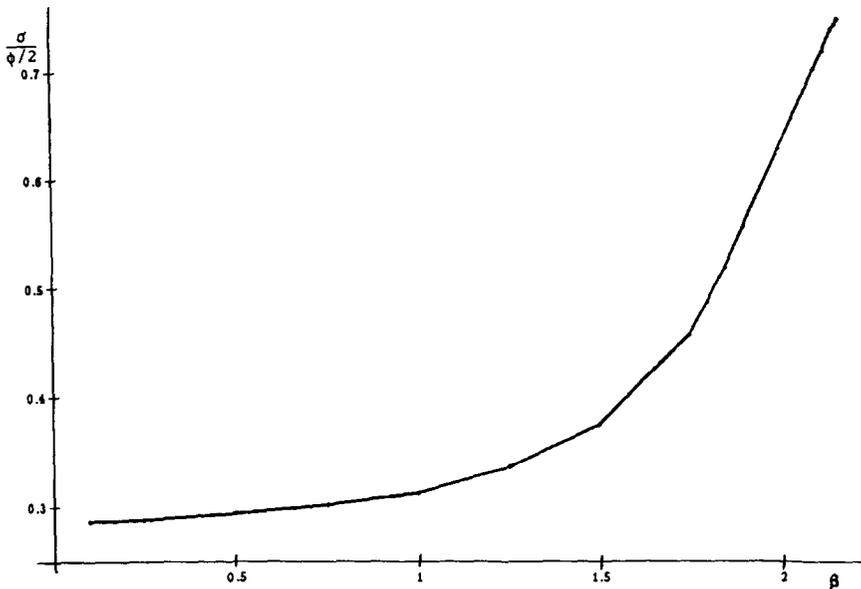


Fig. 5. Expected number of matches using arbitration as proportion of expected international trade.

previously referring their disputes to arbitration now find profitable using the courts.

The effect of β on the level of arbitration services and on the courts is described in Fig. 4. The schedule in the middle of the figure is the level of the legal public good provided when arbitration is not allowed. As implied by Eq. (11), it is linear in β . The highest curve in the figure shows the level of the arbitration services, and the lowest the services provided by the courts when international traders have the option of using arbitration. The numerical analysis confirms the conclusions of Proposition 3. In addition, as β rises, the level of legal services tends to rise both for arbitration and for the courts, in response to the direct effect of β and to changes in ϕ and z . In particular, as ϕ increases arbitration becomes progressively more tailored to the larger needs of highly productive traders at the edge of the international market. This implies increases in arbitration services, and in their cost, that are more than proportional to the change in β .

The result of the model mirrors the informal comments on the rising costs of arbitration often found in the legal literature. The literature attributes the increase in costs to the higher sophistication now expected from arbitrators, as the cases submitted to them have become larger and more complex, often involving several languages, legal regimes and trade usages. It is the result of the expansion of trade, as captured in the model by the change in ϕ .

An implication of this mechanism is the increased divergence between d_c and

d_a in equilibrium, suggesting a role for arbitration in separating traders with high and low needs for legal services. If the heterogeneity among traders finds some expression through arbitration, then it is reasonable to expect that arbitration should also lead to higher aggregate welfare. Indeed, the model assumes that its existence will be supported by the courts only in such case. In all the numerical exercises I have run, I have found that in each country the existence of arbitration leads to higher expected per capita income both on average and for a majority of the country's citizens (although not for everyone). These aggregate measures of welfare gain from arbitration increase with β , because only at higher β does arbitration alter substantially the structure of the markets.²¹

Finally, what is the relationship between the expansion of the international market and the diffusion of arbitration? Consider a trader in the international market. The probability that he will use arbitration equals the probability that he will be matched with a foreigner at distance larger than z . With a continuum of traders, we can consider each individual's probability of a match involving arbitration as independent of other traders' events. If z is larger than ϕ , all potential users of arbitration are in the interval $[-\phi, -(z-\phi)]$. Individual i in this interval has probability $(\phi - z - i)/(2\phi)$ of recurring to arbitration. If we call σ the expected number of matches using arbitration, we find:

$$\sigma = \int_{-\phi}^{\phi-z} (\phi - z - i)/(2\phi) di \quad (25)$$

or

$$\sigma = \frac{(2\phi - z)^2}{4\phi} \quad \text{if } z \geq \phi. \quad (26)$$

If z is smaller than ϕ , then traders in the international market between $-\phi$ and $-z$ use arbitration in all their matches with foreign partners (which occur with probability $1/2$). Traders between $-z$ and 0 expect to use arbitration only with probability $(\phi - z - i)/(2\phi)$. Therefore:

$$\sigma = (\phi - z)/2 + \int_{-z}^0 (\phi - z - i)/(2\phi) di \quad (27)$$

or

$$\sigma = \frac{2\phi^2 - z^2}{4\phi} \quad \text{if } z < \phi. \quad (28)$$

²¹ For β between 2.14 and 2.16, the only qualitative difference between the second equilibrium and the one discussed in the text is that in the former both ϕ and z fall as β rises, implying that the international market contracts but partnerships previously choosing the courts move to arbitration at higher β . Expected income per capita is higher than with courts only, but lower than in the equilibrium discussed in the text.

From (26) and (28), it is clear that as β rises a sufficient condition for an increase in σ is $d\phi \geq dz$. The new traders entering the international market have a preference for arbitration. For the use of arbitration to increase, in absolute terms, we require that not too many partnerships closer to the center of the market switch to the courts, in response to the increased cost of arbitration. According to Fig. 3 such condition is satisfied, and the number of traders using arbitration is expected to increase as the economy develops and the international market expands.

However, the claim of the literature on arbitration is stronger: the *share* of international partnerships choosing arbitration is said to be rising as markets expand. Fig. 5 reports the ratio $\sigma/(\phi/2)$, the expected number of arbitration cases as proportion of the expected volume of international matches, as function of β . As β rises, the ratio increases: the relative expansion in the use of arbitration is larger than the relative expansion in the international market. The higher attractiveness of arbitration at higher β is sufficient to more than compensate its increased cost.²²

5. Conclusions

This paper has presented a general equilibrium model studying the relationship between the expansion of international trade and the adoption of arbitration. The central idea is that the demand for legal services, the requirements in terms of formalism, sophistication, rapidity of enforcement, cost, depend on the economic role of each individual, not on his country of origin. Through international trade, individuals in different countries engaged in the same economic activity come into contact and develop a system of laws attuned to their needs, and in large part independent of national laws. As they do so, they create the institutional basis for further expansion of trade. Private trade leads to the creation of a new, supra-national jurisdiction, and starts the process towards further international integration. International commercial arbitration is a concrete and important example of the link between economic transactions and the creation of international coalitions of private individuals, the emergence 'from the bottom' of international jurisdictions.

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²² The result that the relative use of arbitration increases with β remains true in the second equilibrium, for β between 2.14 and 2.16.

participants to several conferences and seminars for useful comments. I thank Carmine Salvati at the Netherlands Arbitration Institute, Barbara Brady at the American Arbitration Association and Jorge Streb for their help in collecting information and data. Finally, I thank the Center for German and European Studies and the Center for International and Development Economics Research, both at U.C. Berkeley, for financial support.

Appendix A. Analytical proofs

Proposition 2. In all equilibria with arbitration, the international market is larger than it would be with exclusive reliance on the courts, i.e. $\phi > 1/3$.

Proof. (i) Consider first the case $z \geq \phi$. Substituting (15) in (18) and (19), we obtain

$$\beta d_a(2\phi - z)^2 + \beta d_c(2\phi^2 - 2\phi - z^2 + 4\phi z) + 4/3\phi(1 - 3\phi)(1 + \phi) = 0, \quad (\text{A.1})$$

$$\beta d_a(2\phi - z) + \beta d_c(2\phi + z) \leq 2\phi(1 + \phi). \quad (\text{A.2})$$

Since $d_a > d_c$ and $2\phi > z$, (A.1) implies

$$2/3\phi(1 - 3\phi)[2(1 + \phi) - 3\beta d_c] < 0 \quad (\text{A.3})$$

and (A.2) implies

$$2\beta d_c < 1 + \phi. \quad (\text{A.4})$$

Therefore in equilibrium

$$2/3\phi(1 - 3\phi) < 0 \quad (\text{A.5})$$

or $\phi > 1/3$.

(ii) Consider now the case $z < \phi$. As before, substituting (15) in (23) and (24), we establish

$$\beta d_a(3\phi - 2z) + \beta d_c(3\phi - 2 + 2z) + 4/3(1 - 3\phi)(1 + \phi) = 0, \quad (\text{A.6})$$

$$\beta d_a + 3\beta d_c \leq 2\phi(1 + \phi). \quad (\text{A.7})$$

Since $d_a > d_c$ and $\phi > z$, (A.6) implies

$$2/3(1 - 3\phi)[2(1 + \phi) - 3\beta d_c] < 0 \quad (\text{A.8})$$

and (A.7) implies (A.4). From (A.8) and (A.4), it follows that

$$2/3(1 - 3\phi) < 0 \quad (\text{A.9})$$

or $\phi > 1/3$, establishing the result.

Proposition 3. In all equilibria with arbitration, (a) the level of arbitration services is higher than the level of legal services that would be provided in the courts-only case, i.e. $d_a > d$; (b) the level of legal services provided by the courts is lower than it would be without arbitration, i.e. $d_c < d$.

Proof. Part (a): (i) When $z \geq \phi$, Eq. (11) and (20) imply that the proposition holds if

$$3\phi + 3z > 1. \quad (\text{A.10})$$

But (A.10) is always satisfied since $\phi > 1/3$, and $z > 0$.

(ii) If $z < \phi$, Eq. (11) and (26) imply that the proposition holds if

$$3(3\phi^3 - z^3) > 2\phi^2 - z^2. \quad (\text{A.11})$$

But $3(3\phi^3 - z^3) > 6\phi^3$ (since $\phi > z$), and $6\phi^3 > 2\phi^2$ (since $\phi > 1/3$). Since z is positive, $2\phi^2 > 2\phi^2 - z^2$, which establishes the result.

Part (b): To establish part (b) of Proposition 3, we first need to set limits on the value that z can acquire in equilibrium. This is the purpose of the following Lemma.

Lemma 1. In all equilibria with arbitration, $z < 2/3$.

Proof of Lemma 1. (i) When $z \geq \phi$, (A.1) and (A.2) imply

$$(1 + \phi)(2/3 - z) - \beta d_c(1 + \phi - 2z) \geq 0. \quad (\text{A.12})$$

Since $\phi > 1/3$, $(1 + \phi - 2z) > 2(2/3 - z)$, and thus

$$(2/3 - z)(1 + \phi - 2\beta d_c) > 0. \quad (\text{A.13})$$

Since $(1 + \phi) > 2\beta d_c$ by (A.4), the result follows immediately.

(ii) When $z < \phi$, (A.6) and (A.7) imply

$$\beta d_a(\phi - 2z + 2/3) + \beta d_c(2z - 3\phi) \geq 0 \quad (\text{A.14})$$

or

$$d_a \geq d_c \frac{3\phi - 2z}{\phi - 2z + 2/3}. \quad (\text{A.15})$$

Define $\delta_a \equiv d_a/\beta$, and $\delta_c \equiv d_c/\beta$. By (15)

$$z\delta_c = (z - \delta_a)\delta_a. \quad (\text{A.16})$$

Since $\delta_a > z/2$, the right-hand side of (A.16) is decreasing in δ_a . Together with (A.15), this implies an upper bound on the acceptable values for d_c (or equivalently δ_c):

$$z\delta_c \leq \left(z - \delta_c \frac{3\phi - 2z}{\phi - 2z + 2/3} \right) \delta_c \frac{3\phi - 2z}{\phi - 2z + 2/3}. \quad (\text{A.17})$$

Substituting δ_c from (25), and simplifying, (A.17) can be written as

$$(3\phi - 2z)^2(3\phi^3 + 2\phi - 4\phi^2 + z^3) - 8\phi z(3\phi - 1)(\phi - 2z + 2/3) \leq 0. \quad (\text{A.18})$$

Suppose $z \geq 2/3$. Then $\phi \geq 2/3$. The left-hand side of (A.18) is increasing in z , for all ϕ and $z \geq 2/3$. It follows that a necessary condition for equilibrium is that (A.18) be satisfied at $z = 2/3$. But at $z = 2/3$, (A.18) is violated for all $\phi \geq 2/3$. Therefore $z \geq 2/3$ can never be true in equilibrium, establishing the result.

Returning now to part (b) of Proposition 3, consider the case (i) $z \geq \phi$. Eqs. (11) and (21) imply that the proposition holds if

$$2\phi(1 - \phi)^2 - 4/3\phi + z^2(3\phi - z). \quad (\text{A.19})$$

The left-hand side of (A.19) is increasing in z , for all ϕ , and since $z < 2/3$ a sufficient condition for (A.19) is

$$2\phi(1 - \phi)^2 - 8/27 \leq 0. \quad (\text{A.20})$$

Eq. (A.20) is satisfied for all $\phi > 1/3$, establishing $d_c < d$ when $z \geq \phi$.

(ii) When $z < \phi$, Proposition (4) requires:

$$9\phi^3 + 2\phi - 12\phi^2 + 3z^3. \quad (\text{A.21})$$

Suppose first $\phi \leq 2/3$. Since $z < \phi$, and (A.21) is increasing in z for all ϕ , a sufficient condition is

$$6\phi^2 - 6\phi + 1 < 0 \quad (\text{A.22})$$

(obtained by evaluating the left-hand side of (A.21) at $z = \phi$). Eq. (A.22) is satisfied for all $\phi \in [1/3, 2/3]$. Suppose now $\phi > 2/3$. Since $z < 2/3$, a sufficient condition for the result is

$$9\phi^3 + 2\phi - 12\phi^2 + 8/9 < 0. \quad (\text{A.23})$$

This expression is convex for all $\phi \in (2/3, 1]$, and therefore (A.23) is satisfied over the whole relevant range if it is satisfied at the two extremes. It is trivial to check that this is indeed the case, concluding the proof.

Appendix B. Reduced effectiveness of the courts in international deals

The simplicity of the model makes the underlying mechanisms clearer. But the model can easily be made richer. For example, the institutional discussion of arbitration has stressed the potential inefficacy of courts awards in international cases. In the real world international traders recur to arbitration not only because the rules of arbitration can be more closely tailored to their transactions, but also because the enforcement of courts judgments is uncertain. Consider now a group

of countries engaged in a process of progressive integration, the European Union for example, and suppose that enforcement of foreign courts awards were also made easier. What would happen to arbitration, and to international trade?

We can capture the loss of effectiveness of the courts in international disputes by specifying the return to a partnership between agents i and j as follows:

$$y_{ij} = z_{ij}(\beta d_c - z_{ij}) - t \quad \text{if } i, j \text{ belong to the same country;}$$

$$y_{ij} = z_{ij}(\delta\beta d_c - z_{ij}) - t$$

if i, j do not belong to the same country and use the courts;

$$y_{ij} = z_{ij}(\beta d_a - z_{ij}) - t - t_a$$

if i, j do not belong to the same country, and use arbitration.

Setting $\delta < 1$ is equivalent to assuming a lower productivity of the courts in international partnerships. In the absence of arbitration, this leads to smaller ideal distance between international partners, and thus to a smaller size for the international market. When arbitration is possible the effect is less obvious, since we know that the traders at the edge of the international market – and thus defining the size of the market – are the most likely to recur to arbitration, and the least affected by the low productivity of the courts.

The model can be solved following the same steps described earlier. Comparative statics exercises studying the effect of δ on the endogenous variables address the question raised above. Fig. 6 reports the (half) size of the international market as function of δ with (ϕ) and without (f) arbitration, and the corresponding values for d , d_c , and d_a , with β set equal to 1. When arbitration is not available, higher effectiveness of the courts in international disputes (δ closer to 1) increases the size of the international market (f), and the higher productivity of the public good results in a larger share of resources devoted to it (d rises). When arbitration

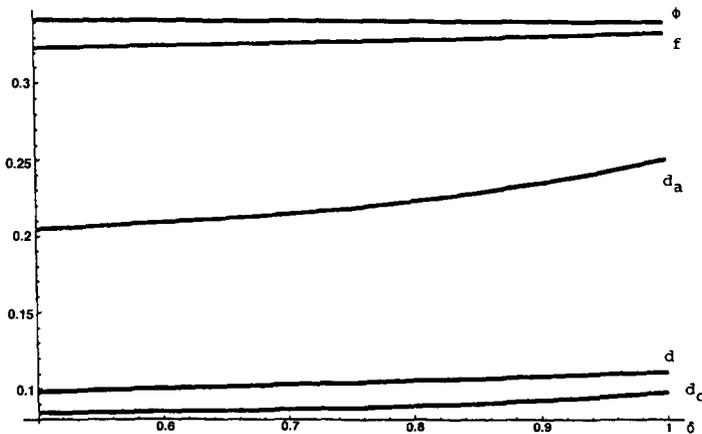


Fig. 6. Reduced effectiveness of the courts in international deals. $\beta = 1$.

Note: f = half-size of the international market in the courts-only case.

is allowed, the main effect of an increase in δ is the increase in the share of international partnerships that recur to the courts. The implication is that arbitration becomes more specialized for more productive, high-distance matches (d_a rises). As the use of arbitration declines, even traders at the edge of the international market begin to use the courts, therefore dampening the positive effect of higher δ on the volume of international trade. Indeed with $\beta = 1$, the size of the international market declines very slightly as δ rises. (As for the details of the solution: with $\beta = 1$, the equilibrium is characterized by $\phi > z$ for $\delta < 0.85$; $\phi < z$ for $\delta > 0.85$: traders at the edge of the international market always use arbitration in international partnerships when δ is smaller than 0.85; they begin to use the courts at higher values of δ . Expected per capita income in each country rises as δ rises, and is always higher when arbitration is possible.)

In summary, improvements in the enforcement of foreign court awards work to restrict the use of arbitration to more specialized transactions. However, if arbitration is possible and widely used, we should not expect these improvements to have a large effect on the size of the international market.

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