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## Arbitration in International Trade

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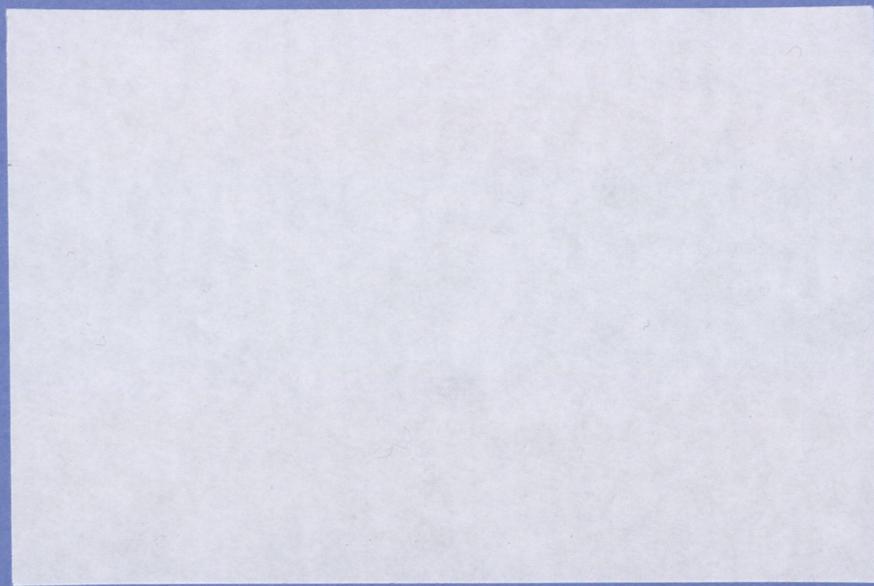
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**Arbitration in International Trade**

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**Abstract**

The great majority of international contracts provides that eventual disputes should be decided by arbitration. Legal scholars argue that international arbitration is leading to the development of a legal doctrine attuned to the needs of business and independent of national laws. This paper studies international arbitration as a beautiful example of the role of private trade in shaping international institutions.

We review the provisions and the practice of international arbitration, and present a general equilibrium model of the relationship between the expansion of international trade and the adoption of arbitration. The model focusses on the heterogeneity existing among economic agents in terms of their legal needs. It shows how arbitration alters the size and composition of markets, while at the same time responding to exogenous changes in trade. In addition, it shows how the legal services provided by the courts deteriorate in the presence of arbitration and predicts that the share of traders using arbitration should rise as markets expand. Overall, the model does remarkably well in generating results commonly discussed in the legal literature.

## 1. INTRODUCTION

According to officials of the Netherlands Arbitration Institute, more than 80 per cent 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 per cent 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, Park and Paulsson (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).

The recent expansion of international arbitration is particularly interesting because 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.<sup>1</sup> 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.

As traders meet across national boundaries, they share the need to develop common forms of communication that would make their transactions possible. These include a language, a currency, a system of standards and conventions, and, most

importantly, a body of laws. New institutions extending beyond national borders are formed to supply these public goods, allowing further expansion of trade and putting the seeds for future political transformations. The debate over a common currency, common standards, common regulations now taking place in the European Community can be seen as an illustration of the role of private trade in shaping new institutions.

The thesis of this paper is that economic questions posed by the increasingly easier movements of goods and factors across national boundaries are strictly tied to the design of new structures, of new "rules of the game" providing the necessary backing for private exchange. Our understanding of economic integration requires explicit acknowledgement of the change in institutions accompanying the change in economic flows. International commercial arbitration provides a beautiful example of the creativity and power of international traders in shaping new forms of organization. While we discuss tensions between the expansion of markets and national sovereignty, businessmen have perfected a whole 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 Schulsz and van der Berg (1982), p.178). Studying international arbitration can help us clarify questions and concepts that should accompany our inquiries into economic integration.<sup>2</sup>

This paper focuses on arbitration as a system of law particularly attuned to the requirements of private international traders. Its goal is to present a simple economic model where the link between the expansion of trade and the development of arbitration is analyzed formally.

The paper opens with a discussion of the provisions regulating arbitration, and the functioning of the most important of the institutions administering

international arbitration, the International Chamber of Commerce in Paris.

Four main points are made clear by the survey. 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, Park and Paulsson, (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 judgements. 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 rapidity in reaching a judgement and likelihood of enforcement, on one side, and cost on the other. Quick and easily enforceable awards are mainly given in proceedings supervised by large arbitration institutions, but 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.

These four features have shaped 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.

The model is a simple general equilibrium framework designed to capture the endogenous formation of markets and the heterogeneous preferences of traders over the legal system. It is an extension of the model presented in Casella and Feinstein (1990). Its central idea is that traders' preferences over the legal system depend on their economic role, and change as the structure of the economy evolves. A continuum of individuals is disposed along a line, partitioned into two identical countries. Individuals divide themselves into three markets, a domestic market in each country and an international market. Each individual decides which market to join, knowing that he will be matched randomly with a partner in the same market, and that their return will depend on their private endowments and on the legal regime they can rely on. Therefore the preferences of each individual over the legal system depend on the market he wants to join, on the partner he expects to meet, and on his endowment.

Each country provides to its citizens a legal system administered by the

national courts, and designed to maximize citizens' average income. Everybody has access to the national courts, and pays taxes to finance their functioning. International partnerships have the option of using arbitration, but if they decide to do so they must pay an extra fee and buy arbitration services. The level of arbitration services (a proxy for their quality) is decided by the traders in the international markets, so as to maximize their expected average income. Finally, the use of arbitration is possible only if allowed by the national courts, since they maintain the final power of enforcement. The courts will support arbitration if it leads to higher expected income per capita.

We obtain three main results. First, the model captures well the simultaneous relationship between economic structure and arbitration. Highly productive traders in the international market recur to arbitration, and the possibility to do so causes the international market to be larger than it would be otherwise. At the same time, changes in exogenous parameters influencing the equilibrium division in markets affect traders' choice between the courts and arbitration. Increases in productivity cause the international market to expand and its composition to change, resulting in better but more costly arbitration, and in increases in its use.

Second, the existence of arbitration affects the provision of legal services by the courts. In part through its influence on markets' structure, in part through the self-selection of traders between the two systems, arbitration allows the courts to reduce their legal services. In other words, the courts restrict themselves to smaller, domestic disputes, while arbitration attracts the more important cases and becomes progressively more sophisticated and more expensive. In the real world, this is exactly the concern expressed by critics 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, (1982), p.

404, referring to opponents of the 1979 English Arbitration Act).<sup>3</sup>

Finally, the model confirms the claim of the legal literature: as international trade expands, the share of traders in the international market preferring arbitration to the courts continues to rise. Even though the cost of arbitration becomes higher, the gap between the services provided by arbitrators and by the courts also increases, and the larger market and higher productivity more than justify the additional expenditure on arbitration.

The model presented in the paper is undoubtedly special and makes no pretense of generality. Still, the basic mechanisms underlying it do remarkably well in explaining the current development of international arbitration. It is tempting to conclude that they may be important ingredients of further researches into international integration.

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 conclude the paper.

## 2. INTERNATIONAL COMMERCIAL ARBITRATION<sup>4</sup>

### (a) General Provisions

In this paper, we focus exclusively on arbitration between private individuals, ignoring 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 XVII 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 XIX 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 quicker decisions and 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 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 decrets 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, Chief Justice of France, 1980). Or: "Usages in the world of international commerce may frequently develop more rapidly than the law" forcing wider acceptance of arbitration (Craig, Park and Paulsson, 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 very 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 indeed 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.<sup>5</sup> 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.<sup>6</sup> 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, Park and Paulsson (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, even from the point of view of the law-makers. 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.<sup>7</sup>

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

arbitration in international matters, recourse to arbitration in domestic disputes is motivated by forces largely idiosyncratic to the specific systems.<sup>8</sup>

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.<sup>9</sup>

(b) 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 XX 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. While 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. In this section, we focus on the International Chamber of Commerce (ICC) in Paris, the largest and most active of the international arbitration institutions. The goal is to identify whose interests the institution represents, and how arbitration services are provided and paid for in practice.<sup>10</sup>

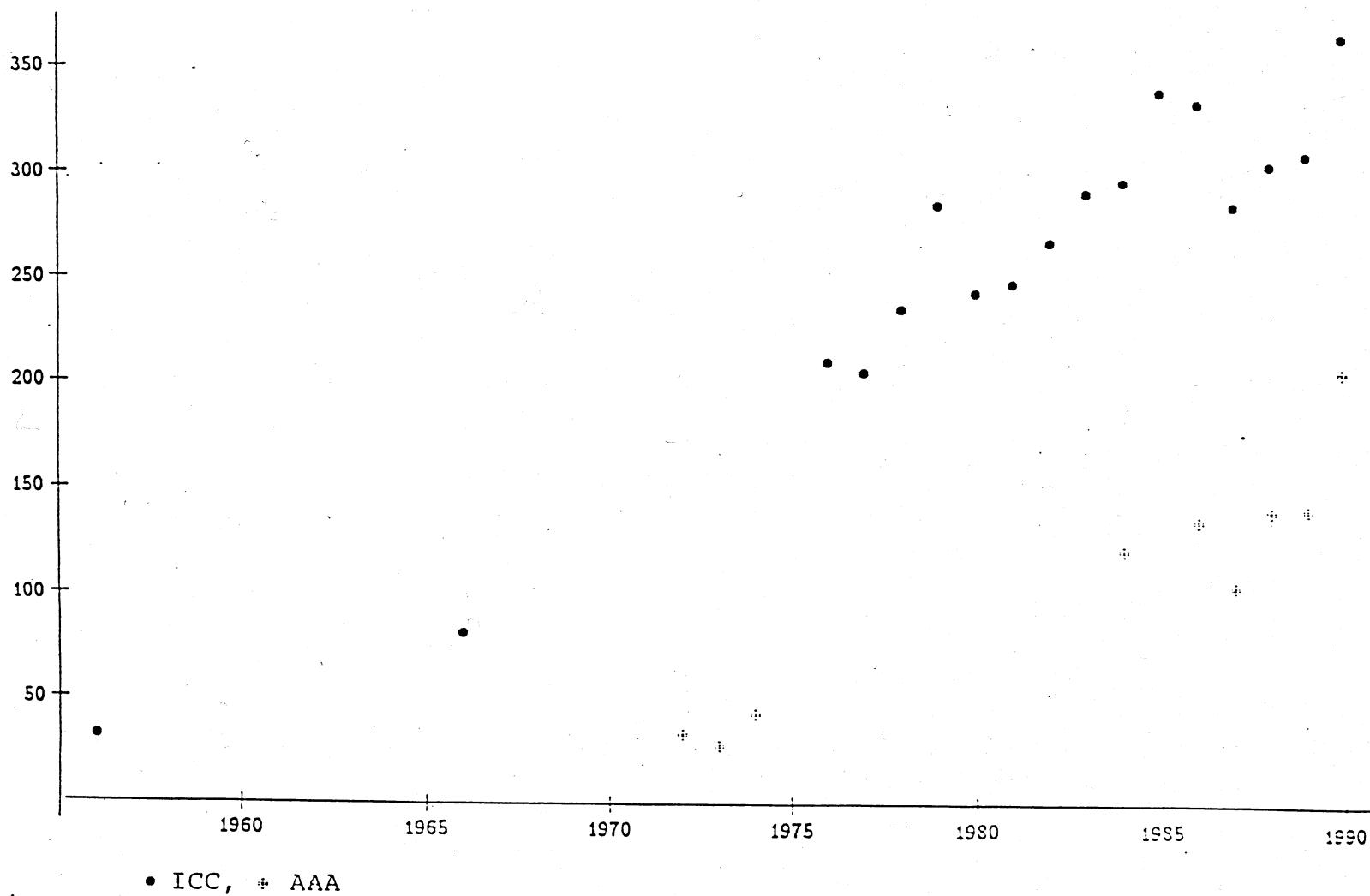
According to its own description, the International Chamber of Commerce (ICC) is "an association of internationally oriented enterprises, and their national organizations, [whose purpose is to] promote international commerce world-wide". In 1989, it represented approximately 7,164 enterprises and organizations, 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, Park and Paulsson (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. Figure 1 reports the number of requests 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

Figure 1

Requests for international arbitration  
ICC and AAA, per year



Sources: ICC: Craig, Park and Paulsson (1990),  
Journal du droit international (Clunet), various issues.

AAA: Arbitration and the Law, various issues,  
personal communication.

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.<sup>11</sup>

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, according to 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, Park and Paulsson (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). Its structure is unusual, but it allows to study quite simply the link between demand and provision of public goods and evolution of

markets. At the minimum, the problem requires heterogeneity among individuals and endogenous market formation, two features that are difficult to embed in more standard set-ups. (See Economides and Siew (1988) for a model similar to ours, and motivated by similar concerns.)

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

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

There are two identical countries: country 1 comprises traders from -1 to 0, and country 2 from 0 to 1. The simple division in two countries implies that on average endowments are more homogenous within each country than across countries.

The model is built around two central assumptions. First, trade benefits from a legal system through which contracts are enforced. The more reliable and predictable the set of rules, and the more rapid the adjudication of disputes, 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 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, North and Weingast (1990), and Greif, Milgrom and Weingast, (1990)).

The second assumption is that traders' preferences over the set of rules embodied in the legal system are heterogeneous. More precisely, they depend on each trader's economic role, as represented by the trader's position in the market. So for example, traditional and small family enterprises may be relatively uninterested in regulations on new and sophisticated financial instruments, and have stronger

opinions on domestic tax rules. More closely related to the topic of this paper, firms producing mainly for domestic markets are probably more concerned with improving the administration of justice at home, than they are with problems of conflict of law in international transactions.

Together, these two assumptions imply a simultaneous relation between markets and legal system. Changes in legal rules influence the formation of markets, while at the same time changes in the composition and size of markets are reflected in changes in the demand and provision of legal services.

A market is defined as a set of traders who engage in bilateral exchange, and markets' composition is not given, but will be determined in equilibrium. When a trader enters a market, he is randomly matched with a partner, and his return from the transaction depends on the two endowments, on an index of productivity and on the legal system he has access to. For simplicity, the pre-tax return from a match between traders  $i$  and  $j$  is described by the following function:

$$y_{ij} = |x_i - x_j| (\beta d - |x_i - x_j|) \quad (2)$$

where  $|x_i - x_j|$  is the distance between the two endowments,  $d$  represents the legal system, and  $\beta$  is an exogenous productivity parameter. A larger  $d$  is meant to capture a more efficient and better functioning legal system.

Equation (2) is discussed at length in Casella and Feinstein (1990), and in Casella (1992). Its two main features are the following. First, it implies that each trader has an ideal partner at distance  $\beta d/2$ . Thus the model recalls Lancaster-type consumption models with differentiated goods (where consumers have ideal varieties), 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 index of development  $\beta$ . 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  $\beta$ . Since each trader's desire to join a specific market depends on the probability of meeting productive partners, equation (2) implies that small markets are advantageous at low levels of development, and with primitive legal systems, but break down when a sufficient legal basis has been created to allow more "distant" partnerships. At higher  $\beta$ , and  $d$ , markets integrate into progressively larger trading pools.

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 random partner. If a market is a segment of traders (as it will be in equilibrium), then 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 more reliable institutions than traders in the middle: each individual's role in the market determines his tastes over the legal system. The heterogeneity is created very simply, within the symmetrical structure of the model.

The courts provide legal enforcement and a body of law to all citizens, and are financed through lump-sum taxes  $t$ . We assume that 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. 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.<sup>12</sup> To simplify the algebra,  $\alpha$  is set equal to  $1/2$ , but the specific value of the parameter will not affect the qualitative results of the model.

In this paper, we study equilibria where the world is divided in 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. Each individual can join only one market, and engage in one transaction. We focus on multiple markets to allow for changes in their composition, and we want at least one international market to capture the specific role of arbitration in international contracts.

In the two domestic markets, all transactions are regulated by national courts, and pre-tax returns are described by equation (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 equation (2), where  $d$  represents for each trader the legal services provided in his country.<sup>13</sup> 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

$$y_{ij} = |x_i - x_j| (\beta d_a - |x_i - x_j|) - t - t_a \quad (4)$$

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 we set  $\alpha = 1/2$ .

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 potential arbitration users. Therefore, 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 meant to capture the role of international traders associations in organizing arbitration rules and courts.<sup>14</sup>

Finally, the use of arbitration is possible only if allowed by the national courts, since they retain the ultimate enforcement power. We assume that the courts will support arbitration only if its existence leads, in equilibrium, to higher welfare for the citizens of the country overall, as measured by average expected per capita income.<sup>15</sup>

Timing is as 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, and given the choice of markets and of legal regimes,  $d$  and  $d_a$  maximize average expected per capita incomes of the relevant groups.

#### 4. SOLUTION OF THE MODEL

Let us first solve the model when traders can only use national courts. This will provide the reference point for the more complex solution with arbitration, and build some intuition about the functioning of the model.

The first question we need to address is the location of the three markets. 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 equation (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.<sup>16</sup>

The second result comes immediately from noticing that in equilibrium the individual located at the border between two markets must be indifferent between joining either of them. If there is no inherent difference between the functioning of the two markets, or between the legal services available to the trader in the two cases, then the markets must have the same size.

We can conclude that in equilibrium there is a unique possible division in three markets: the two domestic markets must be formed by traders in the interval  $[-1, -1/3]$ , in country 1, and traders in  $[1/3, 1]$  in country 2; the international market by traders immediately on the two sides of the border, between  $-1/3$  and  $1/3$ . (See Figure 2a).

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

$$Ey_i = \frac{\beta d_c}{2} (3x_i^2 + 4x_i + \dots) - \frac{5}{3}x_i^2 - \frac{13}{27} - \frac{4}{3}x_i - t_c \quad (6)$$

where  $d_c$  are the legal services provided by the courts (and  $t_c$  the taxes necessary to finance them).

If he decides to join the international market, his expected return is:

Figure 2  
Equilibrium division into three markets

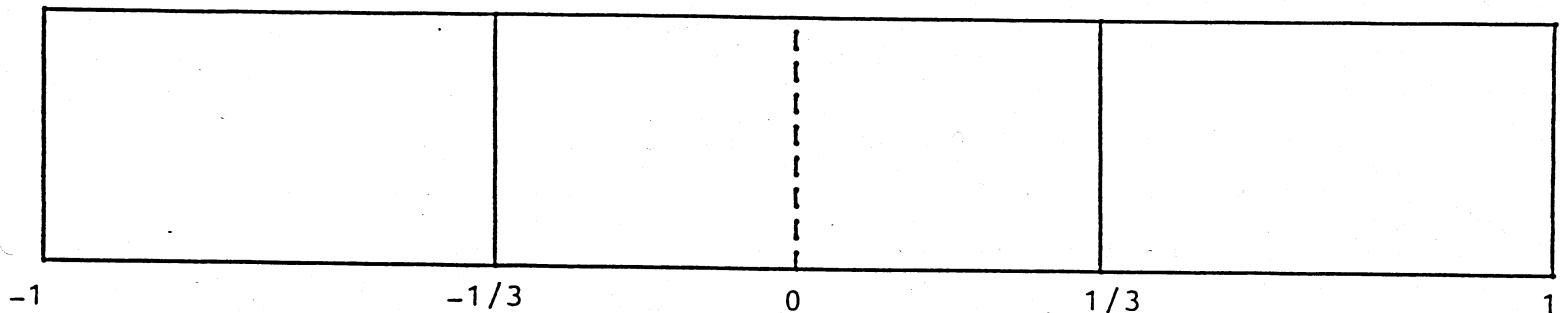


Figure 2a: the courts - only case.

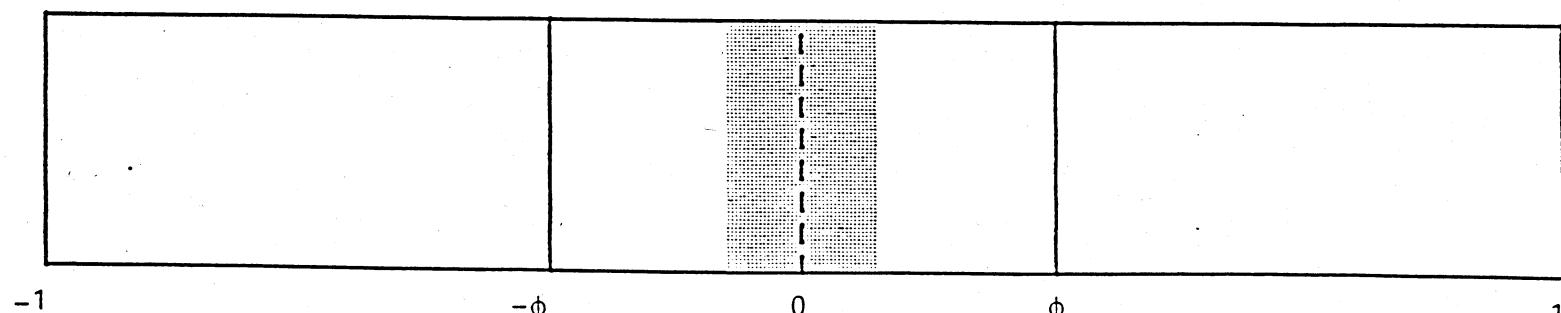


Figure 2b: arbitration and the courts,  $z > \phi$   
Traders in the shaded area never use arbitration.

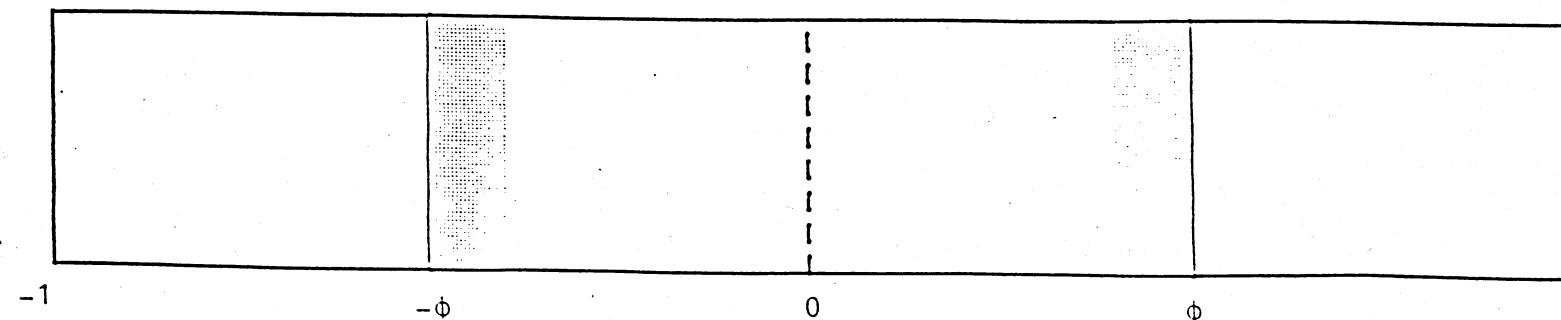


Figure 2c: arbitration and the courts,  $z < \phi$   
Traders in the shaded area use arbitration with all foreign partners.

$$Ey_i = -\beta d_c x_i - x_i^2 - 1/27 - t_c \quad (7)$$

Therefore, the temptation to deviate  $T_i$  is the difference between (7) and (6):

$$T_i = -\beta d_c \left( \frac{3}{2} x_i + \frac{5}{6} x_i^2 + \frac{4}{3} x_i + \frac{4}{9} \right) \quad (8)$$

As expected, (8) is exactly zero when evaluated at  $x_i = -1/3$ , confirming that the individual at the border between the two markets is indifferent between them.

We must also verify that all other traders in the domestic market prefer the market to which they belong.  $T_i$  is strictly concave in  $x_i$ , implying that it reaches a maximum at  $x_i = -1/3$  if and only if its first derivative with respect to  $x_i$  is non negative at  $x_i = -1/3$ . This requirement is equivalent to:<sup>17</sup>

$$\beta d_c \leq 2/3 \quad (9)$$

To understand the meaning of condition (9), and to complete the solution of the model, we need to determine the optimal value of  $d_c$ . It is simple to derive that average per capita income in country 1 is given by:

$$Ey = \frac{2}{9} \beta d_c - \frac{2}{27} - t_c \quad (10)$$

Substituting (3) in (10), and maximizing with respect to  $d_c$ , we find:

$$d_c = \beta/9 \quad (11)$$

Therefore (9) implies:

$$\beta^2 \leq 6 \quad (12)$$

At higher  $\beta$  values, traders find the size of their local market too small, and, looking for more distant partners, jump to the neighboring market, upsetting the equilibrium. If  $\beta$  is larger than  $\sqrt{6}$ , all traders must be together in one single market.<sup>18</sup>

The equilibrium with three markets is now completely characterized. The three markets are contiguous and have identical size. The legal services provided by the national courts are given by equation (11), 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 regulated through the national courts, then the previous result continues to hold: there is a unique equilibrium partition where each market is formed by a connected segment of traders. The two domestic markets are given by traders between  $-1$  and  $-\phi$ , in country 1, and between  $\phi$  and  $1$  in country 2, and the international market by traders between  $-\phi$  and  $\phi$ . 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, when arbitration was not allowed. We will limit attention to this equilibrium, where part of the international transactions rely on the national courts.<sup>19</sup>

As before we focus on country 1. Expected return for traders in the domestic market ( $x_i \in [-1, -\phi]$ ) is given by equation (13)

$$E y_i = \frac{\beta d}{1-\phi} (x_i^2 + x_i(1+\phi) + \frac{1+\phi^2}{2}) - x_i^2 - \frac{1-\phi^3}{3(1-\phi)} - x_i(1+\phi) - t \quad (13)$$

where we now call  $d$  the legal services provided by the courts (and  $t$  the taxes that finance them). This expression is identical to (6), with  $(1/3)$  substituted by  $\phi$ .

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:

$$d_a > d \quad (14)$$

Comparing equations (2) and (4), we see that by using arbitration, international traders  $i$  and  $j$  increase their return by  $\beta(d_a - d)|x_i - x_j|$ , 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:

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

International matches at distance larger than  $z$  will always use arbitration, and matches at distance smaller than  $z$  will use the courts.

As mentioned in the previous section, the core of the model is the endogenous sorting of individuals according to two different dimensions: those who trade domestically versus those who enter the international market, on one side, and those who choose arbitration versus those who refer to the courts, on the other. While the two dimensions are linked, they are not identical, and the two partitions do not coincide. They fulfil two different functions, and the main virtue of the model is its ability to embody these two elements within a remarkably simple structure. Equation (15) and its implicit identification of the variable  $z$  represent therefore one of the two crucial steps in solving the model. Its counterpart is the

determination of the border between domestic and international market, the parameter  $\phi$ .

To solve for the equilibrium in the international market, we must distinguish between two possible regimes. In the first one,  $z$  is larger than  $\phi$ , and some traders located near the center of the international market will never use arbitration. 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. (See Figure 2b).

There is a second regime where  $z$  is lower than  $\phi$ , and all international traders expect to use arbitration in some matches. Traders located near the edges of the market expect to use it in all international partnerships. (See Figure 2c).

Let us consider the first regime ( $z \geq \phi$ ). If  $z \geq 2\phi$ , nobody ever uses arbitration, and we return to the case analyzed at the beginning of this section. Suppose  $z \in [\phi, 2\phi]$ . Then, in country 1, traders in the interval  $[-(z-\phi), 0]$  will never use arbitration, since all possible foreign partners are at distance less than  $z$ . Expected income for  $x_i \in [-(z-\phi), 0]$  is given by:

$$Ey_i = \frac{\beta d}{2} \frac{x_i^2}{\phi} - \frac{\phi^3}{3} - t \quad (16)$$

All traders in the interval  $[-\phi, -(z-\phi)]$ , on the other hand, expect to use arbitration in some of their possible matches. Consider trader  $x_i$  belonging to this interval. The probability of being matched with a partner at distance larger than  $z$ , and therefore of recurring to arbitration, is  $(\phi-(z+x_i))/2\phi$ . In this case the expected distance between the two partners is  $(\phi+z-x_i)/2$ . In all other matches, the traders rely on the national courts. It follows that expected income for trader  $x_i$

$\epsilon [-\phi, -(z-\phi)]$  is:

$$Ey_i = \frac{\beta d}{4\phi} [(x_i + \phi)^2 + z^2] + \frac{\beta d_a}{4\phi} (\phi - z - x_i)(\phi + z - x_i) - x_i^2 - \frac{\phi^2}{3} t - t_a \left( \frac{\phi - z - x_i}{2\phi} \right) \quad (17)$$

As before, the border between the domestic and the international market is identified by the condition that trader  $x_i = -\phi$  be indifferent between the two. Setting (17) equals to (13) at  $x_i = -\phi$ , we obtain:

$$\beta d_a (4\phi^2 - z^2) + \beta d [(\phi - 1)2\phi + z^2] + \frac{4\phi(1 - 2\phi - 3\phi^2)}{3} - 2t_a(2\phi - z) = 0 \quad (18)$$

In addition, the requirement that the temptation to deviate be largest for the border trader implies that the following condition must be satisfied:<sup>20</sup>

$$2\phi\beta(d_a + d) \leq 2\phi(1 + \phi) + t_a \quad (19)$$

As before, if (19) is violated the equilibrium unravels, as traders jump to the market next to theirs.

The arbitration services  $d_a$  are determined so as to maximize average expected per capita income of all potential users. Integrating (17) over  $x_i \in [-\phi, -(z-\phi)]$ , and maximizing with respect to  $d_a$ , we find:

$$d_a = \frac{\beta(\phi + z)}{3} \quad (20)$$

Finally,  $d$  maximizes average expected per capita income over all citizens of country 1. Integrating (13), (16) and (17) over  $x_i$  in the appropriate intervals, and maximizing the result with respect to  $d$  we obtain:

$$d = \frac{\beta}{12\phi} [2\phi(1-\phi)^2 + z^2(3\phi-z)] \quad (21)$$

In the case  $z \geq \phi$ , the equilibrium is now completely characterized. The international market extends from  $-\phi$  to  $\phi$ , 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 or equal to  $z$ .  $\phi$  and  $z$  are determined, along with  $d_a$  and  $d$ , by the system of four equations (15), (18), (20) and (21). In addition, condition (19) must be satisfied.

The second regime, where  $z < \phi$ , can be solved along similar lines.

If  $z$  is smaller than  $\phi$ , then any trader  $x_i$  in the interval  $[-\phi, -z]$  will use arbitration with all foreigners. Taking into account that he must use the national courts in all transactions with domestic residents, his expected income is given by:

$$Ey_i = \frac{\beta d}{4\phi} [(x_i + \phi)^2 + x_i^2] + \frac{\beta d_a}{4} (\phi - 2x_i) - x_i^2 - \frac{\phi^2}{3} - t - \frac{t_a}{2} \quad (22)$$

On the other hand, if  $x_i$  is in the interval  $[-z, 0]$ , he will use arbitration only if matched with a foreign partner at distance larger than  $z$ . His expected income is then given by equation (17).

As before, we determine  $\phi$  from the requirement that the trader between the domestic and the international market must expect equal income from joining either market. Therefore  $\phi$  must solve:

$$3\phi\beta d_a + \beta d(3\phi - 2) + \frac{4(1-2\phi-3\phi^2)}{3} - 2t_a = 0 \quad (23)$$

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

$$\beta d_a + 3\beta d \leq 2(1+\phi) \quad (24)$$

Finally, the optimal levels of  $d$  and  $d_a$  are:

$$d = \frac{\beta}{12} (3\phi^2 + 2 - 4\phi + \frac{z^3}{\phi}) \quad (25)$$

and

$$d_a = \frac{\beta(3\phi^3 - z^3)}{6\phi^2 - 3z^2} \quad (26)$$

In conclusion, when  $z < \phi$ , in equilibrium  $z$ ,  $\phi$ ,  $d$  and  $d_a$  solve the system of equations (15), (23), (25) and (26), and condition (24) must be satisfied.

## 5. 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. Propositions 3 studies the effect of the introduction of arbitration on the provision of legal services.

Proposition 1. Changes in the productivity parameter  $\beta$  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 equation (15), substituting  $t_a$  from (5), and the equilibrium levels of  $d$  and  $d_a$  (equations (20) and (21), or (25) and (26)). The intuition is simply that at higher  $\beta$  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 economic developments trigger changes in traders' alliances to different systems, even in a simplified world where no direct link exists between the productivity parameter and the choice of legal system. Indeed, if we rephrase the decision of using arbitration as the decision to join a specific "club" intent in the provision of a public good, we conclude that the composition and size of the clubs must be modified by innovations in trade. In general terms, the proposition suggests that private trade *per se* may have an important role in shaping the institutions of a society: a world where technological advances lead to changes in the structure of markets is a world where systems for the provision of public goods may need to be constantly redesigned, in response to new coalitions and new needs.<sup>21</sup>

Proposition 2. In all equilibria with arbitration the international market is larger than it would be with exclusive reliance on the courts, i.e.  $\phi > 1/3$ . (The proof is in 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.<sup>22</sup>

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.  $d_a > d_c$ ; (b), the level of legal services provided by the courts is lower than it would be without arbitration, i.e.  $d < d_c$ . (The proof is in 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 is particularly interesting, and confirms in the model the concern often voiced by judges and scholars wary of arbitration. If arbitration attracts the more important, complex and innovative cases, the courts will be deprived exactly of those disputes that are essential to keeping jurisprudence relevant in a rapidly changing world. In commercial matters, the courts may be limited to simpler, more standard cases that would do nothing to further the development of the courts' legal doctrine.

Continuing our analysis of the model's results, we want to study comparative statics responses of the endogenous variables to changes in the productivity parameter  $\beta$ .

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  $\beta$ , while the division between domestic and international market remains unchanged, until the level of  $\beta$  becomes too high to be compatible with the three market equilibrium. As mentioned in footnote 22, the lack of expansion of the international market in the courts-only case is the outcome of the very clean structure we have adopted, for simplicity only. The model can easily be extended to allow for growing international trade even in the absence of arbitration. The extension would have no substantive implications for the questions asked in the paper.

When arbitration is considered, the equilibria are more complex. We have run a series of numerical simulations, and found that the highest value of  $\beta$  compatible with a three-market equilibrium is  $\beta = 2.16$ . For values of  $\beta$  smaller than 2.14, the equilibrium is unique. For  $\beta$  between 2.14 and 2.16, there are two equilibria, one of which disappears with small perturbations in the value of the parameter  $\alpha$ . Given its fragility we ignore it in what follows, limiting its discussion to footnotes.

At low values of  $\beta$ ,  $z$  is larger than  $\phi$ , and the solution of the model is given by equations (15), (18), (20), and (21). Viceversa, for larger  $\beta$  values, the equilibrium requires  $z$  smaller than  $\phi$ , and the solution is given by equations (15), (23), (25), and (26). The transition between the two regimes takes place at  $\beta$  equal 1.85. The order of the two regimes is as expected: at low  $\beta$  values, the importance of more efficient legal services is also low, and traders located in the middle of the international market and involved in potentially less productive partnerships prefer to forgo the expensive option of using arbitration. In this situation, the minimum distance between partners choosing arbitration is larger than  $\phi$ . On the other hand, when  $\beta$  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  $\phi$ .

Figure 3 depicts the (half) size of the international market  $\phi$  as a function of  $\beta$ . At low  $\beta$  values, the option of using arbitration is relatively unimportant, and  $\phi$  is very close to  $1/3$ . The international market is only slightly larger than it would be without arbitration. However, as  $\beta$  rises the value of arbitration rises too, and the international market expands rapidly, while the domestic market contracts.

Figure 4 reports the minimum distance  $z$  between partners who decide to use arbitration, again as a function of  $\beta$ . For lower values of  $\beta$ ,  $z$  is larger than  $\phi$  and falls as  $\beta$  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  $\beta$ . However, after  $\beta$  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 previously referring their disputes to arbitration now find profitable using the courts.

The effect of  $\beta$  on the level of arbitration services and on the courts is described in Figure 5. The schedule in the middle of the figure is the level of  $d$  provided when arbitration is not allowed. As implied by equation (11), it is linear in  $\beta$ . 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  $\beta$  rises, the level of legal services tends to rise both for arbitration and for the courts, in response to the direct effect of  $\beta$  and to changes in  $\phi$  and  $z$ . In particular, as  $\phi$  increases arbitration becomes

Figure 3  
Size of the international market

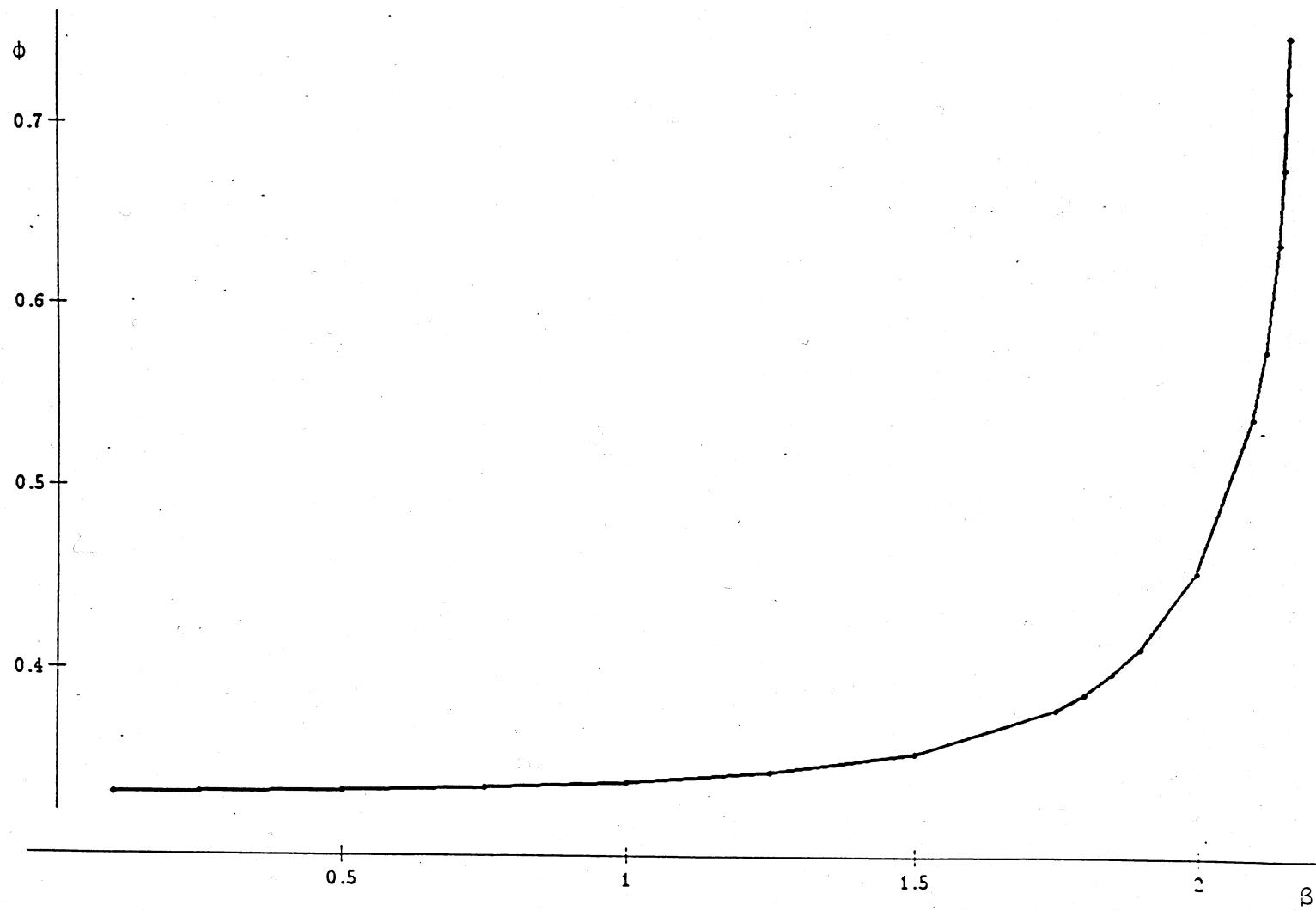


Figure 4

Minimum distance between partners using arbitration

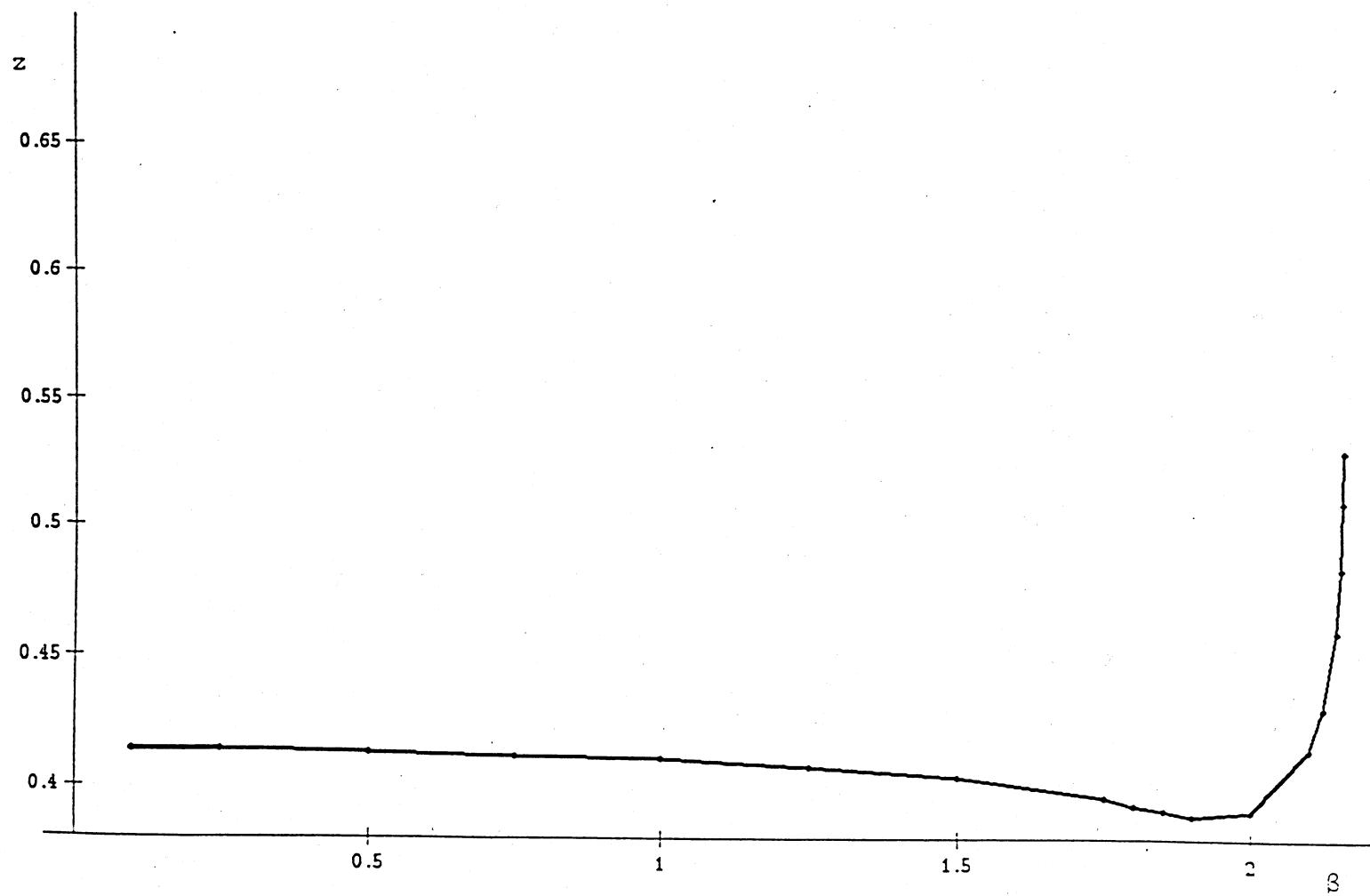
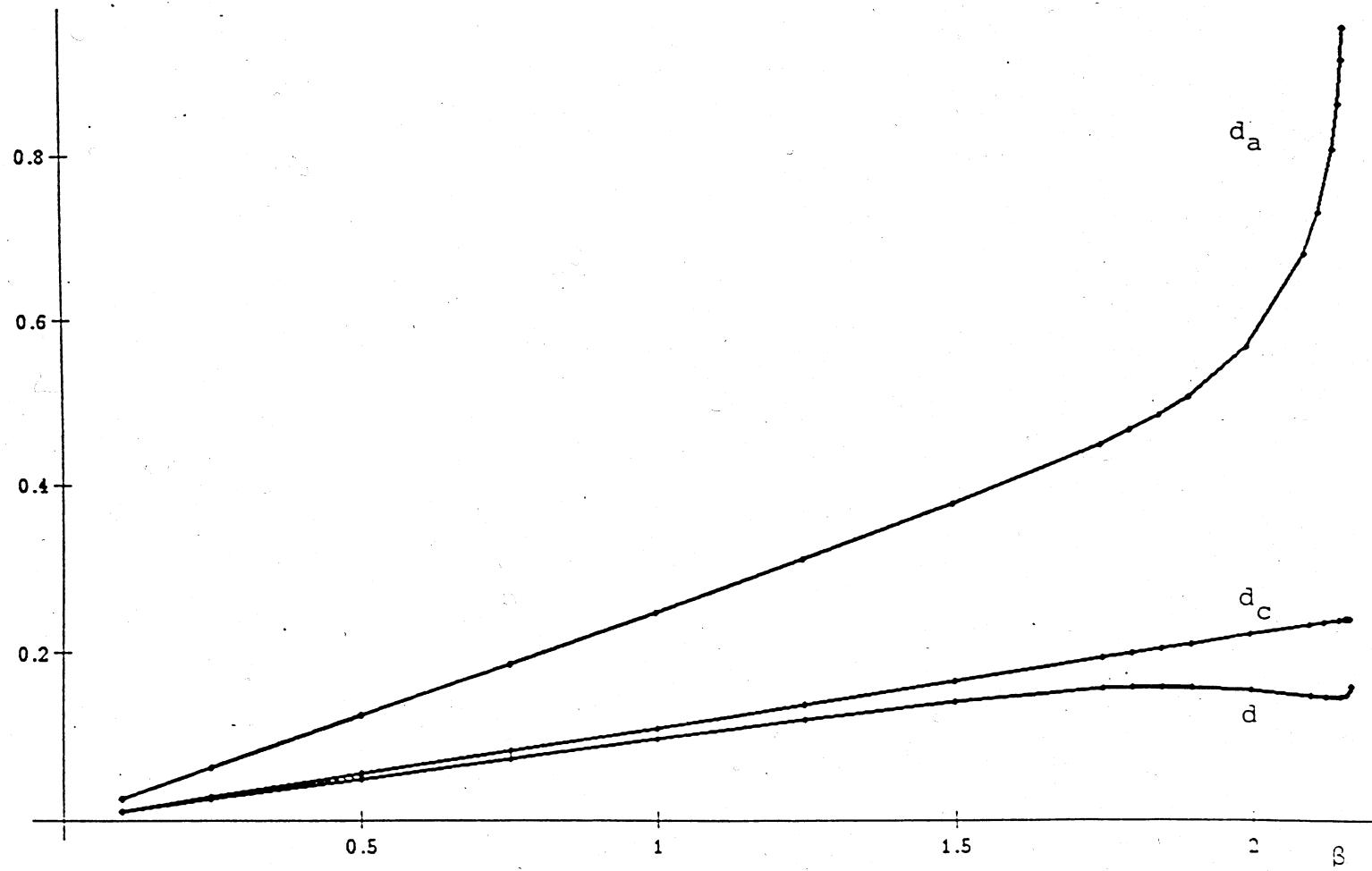


Figure 5

Provision of legal services.  
Arbitration and the courts



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  $\beta$ .

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 and requiring wider knowledge and experience. It is the result of the expansion of trade, exactly as captured in the model by the change in  $\phi$ .

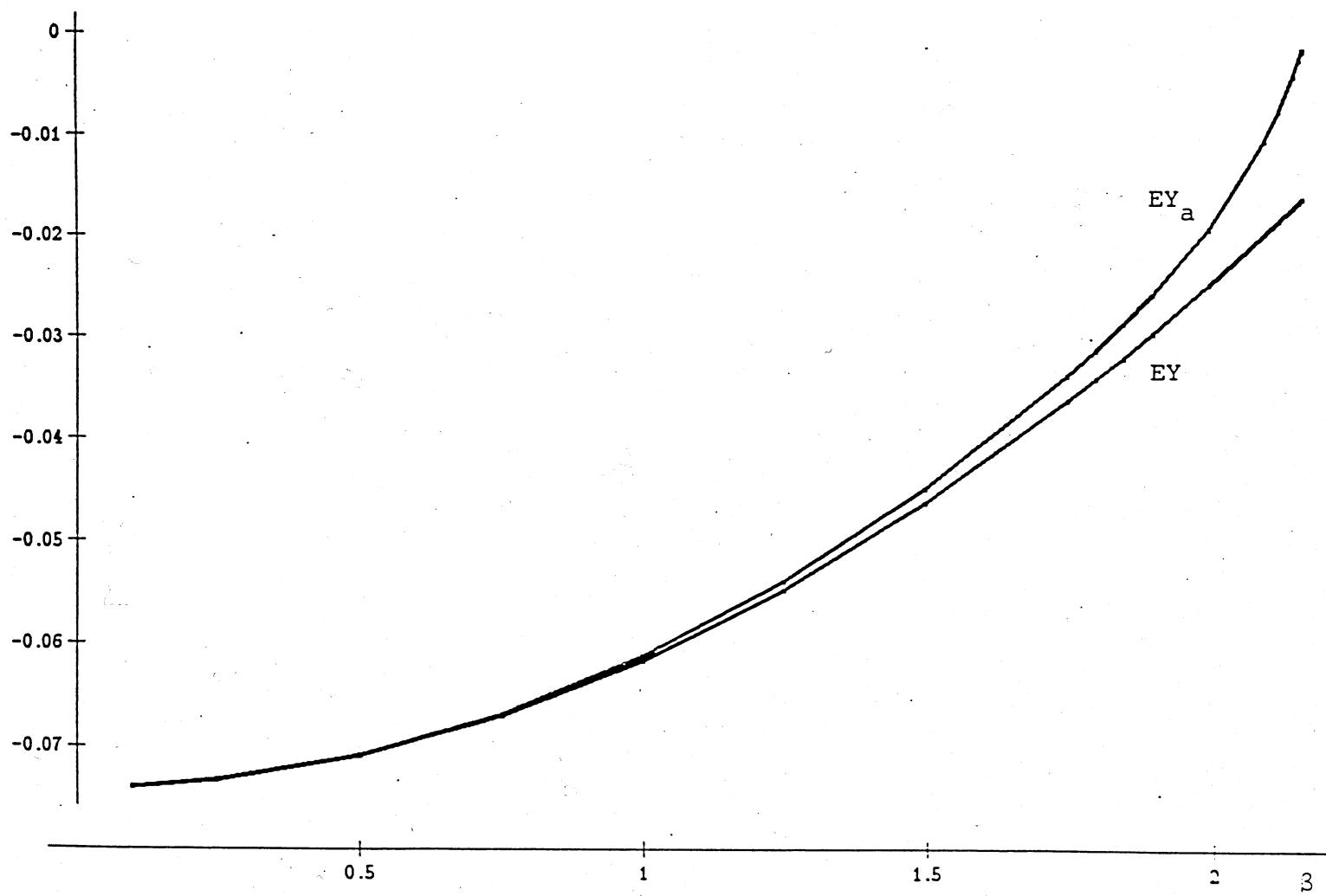
An implication of this mechanism is the increased divergence between  $d$  and  $d_a$  in equilibrium, suggesting a role for arbitration in separating traders with high and low needs for legal services. If the heterogeneity among traders finds some expression through arbitration, then it is reasonable to expect that arbitration should also lead to higher average income. Indeed, we have assumed that its existence will be supported by the courts only in such case. Figure 6 shows expected average per capita income in the equilibrium with courts only, and in the equilibrium with arbitration, as function of  $\beta$ . For all values of  $\beta$ , arbitration raises welfare, according to this aggregate measure. The gain from arbitration increases with  $\beta$ : only at higher  $\beta$  does arbitration alter substantially the structure of the markets, and the provision of legal services.<sup>23</sup>

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  $z$ . If  $z$  is larger than  $\phi$ , then all potential users of

Figure 6

Average expected per capita income.  
Arbitration and the courts



arbitration are in the interval  $[-\phi, -(z-\phi)]$ . Individual  $x_i$  in this interval has probability  $(\phi-z-x_i)/(2\phi)$  of recurring to arbitration. Since there is a continuum of traders, we consider each individual's probability of a match involving arbitration as independent of other traders' events. If we call  $\sigma$  the expected number of matches using arbitration, we find:

$$\sigma = \int_{-\phi}^{\phi-z} (\phi-z-x_i)/(2\phi) dx_i \quad (27)$$

or

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

If  $z$  is smaller than  $\phi$ , 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  $(\phi-z-x_i)/(2\phi)$ . Therefore:

$$\sigma = (\phi-z)/2 + \int_{-z}^0 (\phi-z-x_i)/(2\phi) dx_i \quad (29)$$

or

$$\sigma = \frac{2\phi^2-z^2}{4\phi} \quad \text{if } z < \phi \quad (30)$$

From (28) and (30), it is clear that as  $\beta$  rises a sufficient condition for an increase in  $\sigma$  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 Figures 3 and 4 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. Figure 7 reports the ratio  $\sigma/(\phi/2)$ , the expected number of arbitration cases as proportion of the expected volume of international matches, as function of  $\beta$ . As  $\beta$  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  $\beta$  is sufficient to more than compensate its increased cost<sup>24</sup>

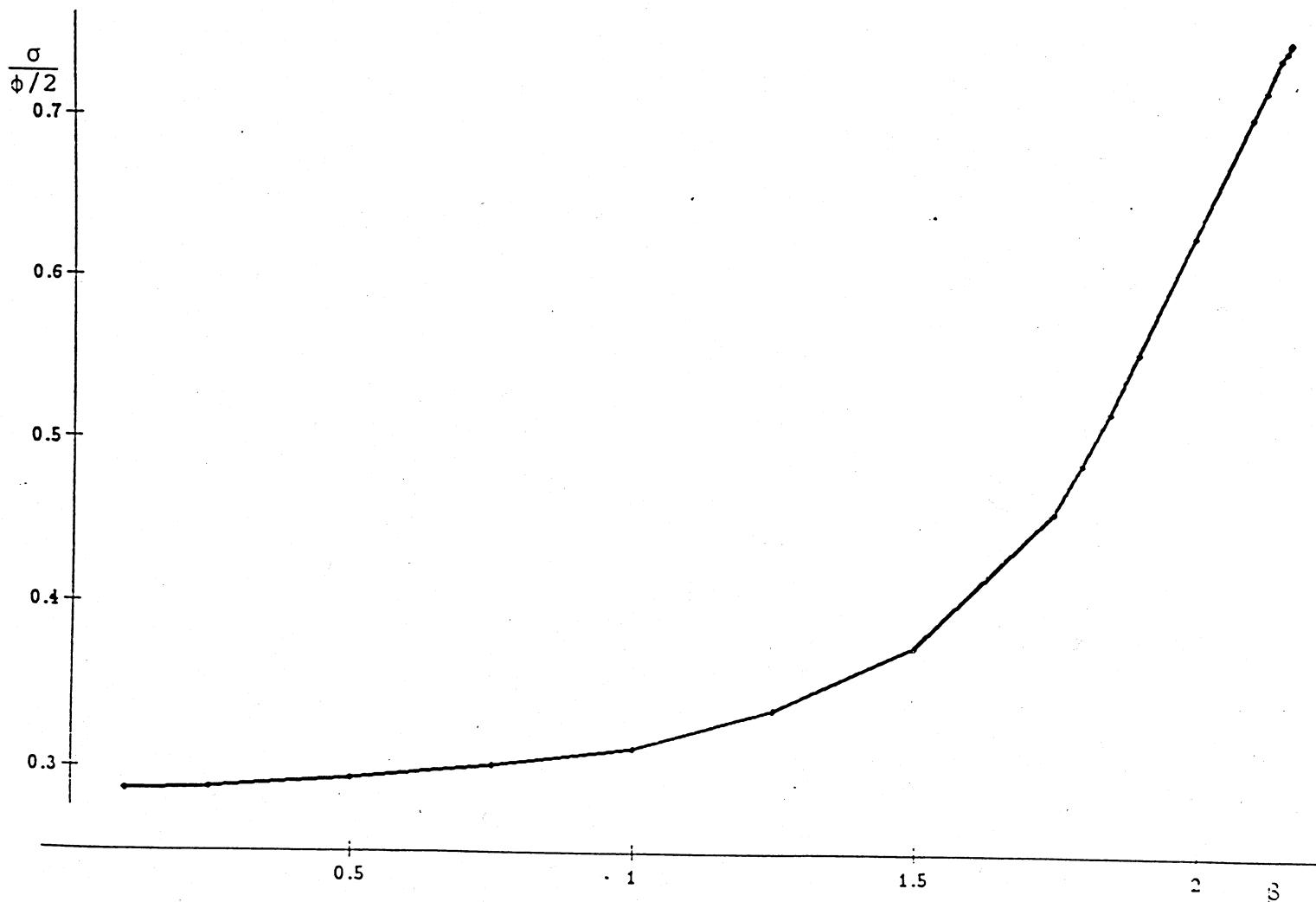
## 6. CONCLUSIONS

This paper has presented a general equilibrium model focused on 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. Private trade leads to the creation of a new, supranational jurisdiction, and starts the process towards future international integration. Arbitration is a concrete and important example of the link between private economic transactions and the emergence of new international structures.

The model has led to three main results, remarkably consistent with the discussion of international arbitration in the legal literature. First of all, the

Figure 7

Expected number of matches using arbitration  
as proportion of expected international trade



possibility to recur to arbitration influences the formation of markets. Highly productive traders that were previously avoiding the international market for lack of appropriate legal protection can now engage in international trade. At the same time, changes in the composition of markets triggered by exogenous developments affect the decision to use arbitration. The expansion of trade leads to an increase in the cost of arbitration, but also to higher need for an efficient legal system.

Second, in the presence of arbitration the courts concentrate progressively on less productive traders who cannot afford arbitration. This causes the deterioration of the courts' legal system, and an increasing gap between the courts' system and the ever larger level of the arbitration services. On average, however, the development is beneficial, since it allows traders to self-select according to their legal needs.

Finally, the proportion of traders choosing arbitration increases at higher productivity levels and with a larger international market. The rising cost of arbitration is more than compensated by the benefits traders gain from arbitration services, especially in the absence of an effective courts' system.

## FOOTNOTES

\* I thank Richard Buxbaum, Jonathan Feinstein, David Romer, Jorge Streb, Barry Weingast, the members of the study group on Political Economy of European Integration at U.C. Berkeley, and seminar participants at M.I.T., Stanford, the University of Vienna and the University of Zurich for useful comments. I thank Francesco Salvati at the Netherlands Arbitration Institute and Barbara Brady at the American Arbitration Association 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, and Jorge Streb for excellent research assistance.

1. The expression was coined by Grossman-Doerth, quoted in Langen (1973).
2. 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).
3. 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).
4. The literature is naturally very large. The following sources were especially useful: Mustill and Boyd (1982) for British law, David (1985) for a comparative approach, and Craig, Park and Paulsson (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.
5. Fouchard in Fouchard, Kahn and Lyon-Caen (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 decrets on arbitration require that the arbitration decision be rendered according to principles of law.
6. See the discussion in Craig, Park and Paulsson (1990), chapter 35, and the papers by Jakubowski and by Lew in Schultsz and van den Berg (1982).
7. See Schmitthof in Schultsz and van den Berg (1982) and Craig, Park and Paulsson (1990), chapter 28.
8. See for example David (1985) or the papers collected in Sanders (1967), Schultsz and van den Berg (1982), and Fouchard, Kahn, and Lyon-Caen (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.)

9. 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 Judgements in Civil and Commercial Matters, which however is limited to the countries of the European Community. The unanimous opinion is that international treaties have been remarkably ineffective in the case of litigation. (See for example David (1985): "There is a strong possibility that a judgement given by the courts of a given state should be unenforceable outside the territory of the state", p.17)

10. The 1989 Columbia University Guide provides a synthetic and up-to-date review of the major international arbitration institutions.

11. 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 an extensive review of courts decisions in disputes involving international contracts, see, for example, Langen (1973) or Delaume (1992).

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

13. This description of the choice of legal regime embodies a number of simplifying assumptions. 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. For the purposes of this paper, what matters is the recognition that arbitration plays a larger role in international transactions than it does in domestic matters. Assuming that arbitration is only available in international matches is the simplest way of making the point. Extending the model to capture the cost of using the courts in international disputes is straightforward, and only strengthens the conclusions presented in the paper.

14. In an alternative specification, international traders could pay a fixed cost to enter an "arbitration club" before matching occurs. Arbitration would then be decided according to the preferences of the members, and 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.

15. Since agents are heterogenous, aggregate measures of welfare are problematic. A more "democratic" criterion, requiring at least 50 per cent of the country

nationals to benefit from the existence of arbitration, leads to the same results.

16. See Casella and Feinstein (1990) for the formal proof. Establishing a result of this type is essential to reduce the number of possible equilibria, and make the model at all viable.

17. Two points should be noted: (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.

18. The existence of an upper bound on the values of  $\beta$  consistent with a three market equilibrium is a general feature of the model. Its specific value, and the unique equilibrium with one single market for higher  $\beta$  are implications of  $\alpha = 1/2$ . See the discussion in Casella and Feinstein (1990).

19. 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.)

20. Condition (19) is necessary and sufficient if  $(1-\phi)(d_a - d) \leq 4\phi d$ . Equations (15), (18) and (20) imply that this inequality must be satisfied in all equilibria.

21. Proposition 1 does not depend on the value of the parameter  $\alpha$ . A direct link between  $\beta$  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 not that such link is absent, but that even in its absence  $z$  responds, in equilibrium, to changes in  $\beta$ .

22. Two comments: (1) Without arbitration, the borders of the international market are fixed at  $-1/3$  and  $1/3$  for all values of  $\beta$ . 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  $\beta$ . (2) It is also possible to show that the transition to a single market must happen at a lower  $\beta$  value in the presence of arbitration. As in the case of Proposition 1, what matters is not the specific lower bound for  $\phi$ , or upper bound for  $\beta$ , but the general principle that arbitration modifies the structure of economic transactions. This conclusion is robust to most changes in assumptions, if the logic of the model is preserved.

23. For  $\beta$  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  $\phi$  and  $z$  fall as  $\beta$  rises, implying that the international market contracts but partnerships previously choosing the courts move to arbitration at higher  $\beta$ . Expected income per

capita is higher than with courts only, but lower than in the equilibrium discussed in the text.

24. The result that the relative use of arbitration increases with  $\beta$  remains true in the second equilibrium, for  $\beta$  between 2.14 and 2.16.

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## APPENDIX

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:

$$\beta d_a (2\phi - z)^2 + \beta d (2\phi^2 - 2\phi - z^2 + 4\phi z) + 4/3 \phi (1-3\phi) (1+\phi) = 0 \quad (A1)$$

$$\beta d_a (2\phi - z) + \beta d (2\phi + z) \leq 2\phi (1+\phi) \quad (A2)$$

Since  $d_a > d$  and  $2\phi > z$ , (A1) implies:

$$2/3 \phi (1-3\phi) [2(1+\phi) - 3\beta d] < 0 \quad (A3)$$

and (A2) implies:

$$2\beta d < 1+\phi \quad (A4)$$

Therefore in equilibrium:

$$2/3 \phi (1-3\phi) < 0 \quad (A5)$$

or  $\phi > 1/3$ .

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

$$\beta d_a (3\phi - 2z)^2 + \beta d (3\phi - 2 + 2z) + 4/3 (1-3\phi) (1+\phi) = 0 \quad (A6)$$

$$\beta d_a + 3\beta d \leq 2\phi (1+\phi) \quad (A7)$$

Since  $d_a > d$  and  $\phi > z$ , (A6) implies

$$2/3 (1-3\phi) [2(1+\phi) - 3\beta d] < 0 \quad (A8)$$

and (A7) implies (A4). From (A8) and (A4), it follows:

$$2/3 (1-3\phi) < 0 \quad (A9)$$

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.  $d_a > d_c$ ; (b) the level of legal services provided by the courts is lower than it would be without arbitration, i.e.  $d < d_c$ .

Proof of part (a): (i) When  $z \geq \phi$ , equations (11) and (20) imply that the proposition requires:

$$3\phi + 3z > 1 \quad (A10)$$

But (A10) is always satisfied since  $\phi > 1/3$ , and  $z > 0$ .

(ii) If  $z < \phi$ , equations (11) and (26) imply that the proposition requires:

$$3(3\phi^3 - z^3) > 2\phi^2 - z^2 \quad (\text{A11})$$

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.

Proof of 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  $z \geq \phi$ , (A1) and (A2) imply:

$$(1+\phi)(2/3 - z) - \beta d(1+\phi - 2z) \geq 0 \quad (\text{A12})$$

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

$$(2/3 - z)(1+\phi - 2\beta d) > 0 \quad (\text{A13})$$

Since  $(1+\phi) > 2\beta d$  by (A4), the result follows immediately.

(ii) When  $z < \phi$ , (A6) and (A7) imply:

$$\beta d_a(\phi - 2z + 2/3) + \beta d(2z - 3\phi) \geq 0 \quad (\text{A14})$$

or

$$d_a \geq d \frac{3\phi - 2z}{\phi - 2z + 2/3} \quad (\text{A15})$$

Define  $\gamma_a = d_a/\beta$ , and  $\gamma = d/\beta$ . By (15)

$$z\gamma = (z - \gamma_a)\gamma_a \quad (\text{A16})$$

Since  $\gamma_a > z/2$ , the right-hand side of (A16) is decreasing in  $\gamma_a$ . Together with (A15), this implies an upper bound on the acceptable values for  $d$  (or equivalently  $\gamma$ ):

$$z\gamma \leq (z - \gamma \frac{3\phi - 2z}{\phi - 2z + 2/3}) \gamma \frac{3\phi - 2z}{\phi - 2z + 2/3} \quad (\text{A17})$$

Substituting  $\gamma$  from (25), and simplifying, (A17) can be written as:

$$(3\phi - 2z)^2 (3\phi^3 + 2\phi - 4\phi^2 + z^3) - 8\phi z (3\phi - 1) (\phi - 2z + 2/3) \leq 0 \quad (\text{A18})$$

Suppose  $z \geq 2/3$ . Then  $\phi \geq 2/3$ . The left-hand side of (A18) is increasing in  $z$ , for all  $\phi$  and  $z \geq 2/3$ . It follows that a necessary condition for equilibrium is that (A18) be satisfied at  $z = 2/3$ . But at  $z = 2/3$ , (A18) 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)  $z \geq \phi$ . Equations (11) and (21) imply that the proposition requires:

$$2\phi(1-\phi)^2 - 4/3 \phi + z^2(3\phi-z) < 0 \quad (\text{A19})$$

The left-hand side of (A19) is increasing in  $z$ , for all  $\phi$ , and since  $z < 2/3$  a sufficient condition for (A19) is:

$$2\phi(1-\phi)^2 - 8/27 \leq 0 \quad (\text{A20})$$

(A20) is satisfied for all  $\phi > 1/3$ , establishing  $d < d_c$  when  $z \geq \phi$ .

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

$$9\phi^3 + 2\phi - 12\phi^2 + 3z^3 < 0 \quad (\text{A21})$$

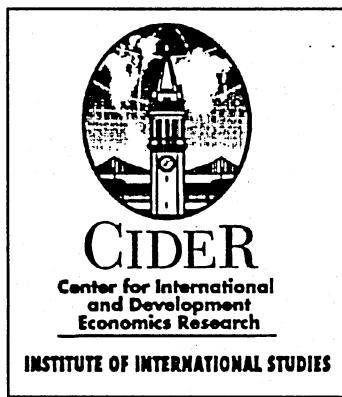
Suppose first  $\phi \leq 2/3$ . Since  $z < \phi$ , and (A21) is increasing in  $z$  for all  $\phi$ , a sufficient condition is

$$6\phi^2 - 6\phi + 1 < 0 \quad (\text{A22})$$

(obtained by evaluating the left-hand side of (A21) at  $z = \phi$ ). (A22) 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:

$$9\phi^3 + 2\phi - 12\phi^2 + 8/9 < 0 \quad (\text{A23})$$

This expression is convex for all  $\phi \in (2/3, 1]$ , and therefore (A23) 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.



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