2003

Mediators as the Walrasian Auctioneers of Exchange Theory

David Dickenson

Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/eri

Recommended Citation
https://digitalcommons.usu.edu/eri/267

This Article is brought to you for free and open access by the Economics and Finance at DigitalCommons@USU. It has been accepted for inclusion in Economic Research Institute Study Papers by an authorized administrator of DigitalCommons@USU. For more information, please contact rebecca.nelson@usu.edu.
Economic Research Institute Study Paper

ERI #2003-09

MEDIATORS AS THE WALRASIAN AUCTIONEERS OF EXCHANGE THEORY

by

DAVID DICKINSON

Department of Economics and
Department of Management & Human Resources
Utah State University
3530 Old Main Hill
Logan, UT 84322-3530

August 2003
MEDIATORS AS THE WALRASIAN AUCTIONEERS OF EXCHANGE THEORY

David L. Dickinson, Assistant Professor

Department of Economics and
Department of Management & Human Resources
Utah State University
3530 Old Main Hill
Logan, UT 84322-3530

The analyses and views reported in this paper are those of the author(s). They are not necessarily endorsed by the Department of Economics or by Utah State University.

Utah State University is committed to the policy that all persons shall have equal access to its programs and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Information on other titles in this series may be obtained from: Department of Economics, Utah State University, 3530 Old Main Hill, Logan, UT 84322-3530.

Copyright © 2003 by David L. Dickinson. All rights reserved. Readers may make verbatim copies of this document for noncommercial purposes by any means, provided that this copyright notice appears on all such copies.
MEDIATORS AS THE WALRASIAN AUCTIONEERS OF EXCHANGE THEORY

David Dickinson

ABSTRACT

This article opens up mediation to systematic economic analysis by considering mediators as analogous to the Walrasian auctioneers of exchange theory. By altering trade-off rates among bargaining issues, mediators facilitate a process leading towards Pareto efficient voluntary settlements.

JEL classifications: J52, D51

Key words: mediation, dispute resolution, exchange economy
1. Introduction

Mediation is one of the world's oldest forms of alternative dispute resolution (ADR). It uses a neutral third-party to help resolve disputes, but mediators generally do not have binding decision-making authority. As such, mediators are effective only in as much as they can facilitate a voluntary settlement among the disputants. This contrasts with the role of an arbitrator, who dictates a binding settlement for the disputants. Mediation is utilized across the globe and it helps resolve disputes in a large variety of settings that include labor-management negotiations, international relations, community disputes, school conflicts, and legal disputes, among others (see Wall et al., 2001, for a review).

In the U.S., formal mediation plays a prominent role in labor contract disputes, courtmandated pre-trial mediation, and it is becoming increasingly used to resolve community disputes. The Federal Mediation and Conciliation Services, established in 1947 under the Taft-Hartley Act, mediated approximately 20,000 labor disputes annually from 1994-1998 in the U.S. Also, the National Association for Community Mediation reports that the number of community mediation programs in the U.S. has surged in the past decade from about 150 to over 500, and these programs are now estimated to mediate over 45,000 cases annually.1 The stakes of mediation efforts range from relatively small (e.g., grievance mediation of employment disputes) to enormous (e.g., U.S. mediation efforts between Israel and Palestine).2

---

*This paper has benefited from conversations with John Gilbert, Linda Babcock, Ronda Callister, and Hisako Kure.

1Data available from FMCS at http://www.fmcs.gov/annuals/98/dm.htm and from the NAFCM website, page http://www.nafcm.org/pg5.cfm, respectively.

2The use of mediation is even more widespread if one considers that judges often employ mediation skills
Given the history, growth, and prevalence of mediation it is somewhat surprising that economic research has done little to analyze the process and outcomes of mediation. This is likely due to the prevailing notion that mediation is an “art” form and, since successful mediators “orchestrate” settlements, the process itself is not well suited for systematic analysis. This article highlights how economic analysis can bring something to bear on our understanding of mediation by recognizing that mediators are the essentially Walrasian auctioneers of exchange theory. Our simplest understanding of general equilibrium utilizes the Edgeworth Box and speaks of the Walrasian auctioneer who calls out prices to generate equilibrium in the exchange of two goods between two consumers. Negotiators who bargain over the allocation of two or more issues can be viewed as participants in an exchange economy, and mediators play the role of the Walrasian auctioneer in attempting to generate a Pareto efficient equilibrium. This is a simple yet powerful insight: the basic task of the mediator is to vary the relative price among the issues on the bargaining table in order to induce voluntary agreement among negotiators.

This article proceeds by outlining a simple Edgeworth Box framework, highlighting the mediator’s role as the Walrasian auctioneer, and noting the implications of the first and second welfare theorems on mediation. We will also highlight the distinction between mediation and arbitration and characterize the welfare implications of these distinct ADR procedures. Though mediation is often considered a form of art not well suited to rigorous analysis, several implications of the general equilibrium theory analysis can be highlighted. First, mediators are ultimately successful by varying the perceived trade-off rate (i.e., the relative price) among bargaining issues. Secondly, a non-neutral mediator can guide negotiators towards specific outcomes by introducing outside resources into mediation. Such mediators may be guided by outside the courtroom in promoting settlement prior to trial (see Raiffa, 1982).
their own preferences, notions of fairness, etc. Finally, mediated outcomes will generally Pareto dominate arbitrated outcomes.

The purpose of this article is not to minimize the importance of the skill required of a successful mediator, but rather it is to weed through the sea of behavioral techniques employed by mediators until we are left with the core task at hand—altering relative prices to generate bargaining equilibrium. The implications of this approach to viewing dispute resolution may open the door to a more systematic way of analyzing mediation, while also highlighting its efficiency advantage over arbitration, which may justify the accolades mediation often receives over other forms of dispute resolution.

2. Negotiations and Dispute as an Exchange Economy

Assume the simplest case of bilateral negotiations of bargainers, \(a\) and \(b\), over two issues, \(x_1\) and \(x_2\). This is the simplest case that allows for “trade-offs” between issues, although the analysis extends easily to the \(n\)-issue case (as well as the \(m\)-bargainer case). Assume well-behaved preferences such that 
\[U_i'(x_i) > 0 \quad \text{and} \quad U_i''(x_i) < 0\]
for \(j = a, b, i = 1, 2\). Now consider an Edgeworth “Bargaining” Box. Assume an initial endowment that exhausts the total supply of both items. The initial endowment may be the result of a previous round of contract negotiations in repeated bargaining or long-term relationships. An example of two items in a typical labor management dispute would be profits (or excess profits) and job security of employees. Management would then have preferences that are increasing in both the amount of

\[\text{Footnotes:}
\begin{align*}
3 \text{The ability to highlight the key item to successful mediation is also important as a growing number of community-based mediation programs utilize community volunteers who, though trained to some extent, may respond better to a simple description of how to accomplish their objectives.}
4 \text{This section draws upon insights in Raiffa (1982).}
\end{align*}
\]
its profits retained and in workforce flexibility (e.g., the opposite of job security to the workers). The dimensions of the Edgeworth Box may be determined by physical limitations (e.g., profits), legislated limitations (e.g., work hours limitations), or also by a previous stage of negotiations.

A common characteristic of negotiations is making trade-offs among bargaining issues, \( x_i \) for \( x_j \), which is reflected in the bargainers' relative price or trade-off rate among issues. Figure 1 shows the basic Edgeworth Box diagram under the assumption of an incorrect relative price that yields excess demand for bargaining issues \#1. Note the key point here: any dispute can be viewed as state of excess demand for at least one bargaining issue.

At this point, simple general equilibrium theory introduces the mythical Walrasian auctioneer who calls out prices and adjusts them appropriately to generate equilibrium in the economy. Note that this is precisely the role played in mediating a dispute among negotiators. The mediator facilitates a process of "tâtonnement" (curiously but typically translated as "groping") described in the classic work of Walras (1926), whereby proposed trade-offs between negotiated items go back and forth until there is equilibrium in the system of equations of negotiated items. A mediator has no authority (generally) to impose a binding settlement, and so the key tool at his disposal is the ability to change the terms of trade among \( x_1 \) and \( x_2 \).

Specifically, since Figure 1 shows a case of excess demand for issue 1 (e.g., profits, which is usually evidenced by a firm's wage offer < union's wage demand), the mediator must "increase" the price of issue 1 relative to issue 2. By doing so to the correct extent the negotiators would voluntarily choose the equilibrium agreement point in Figure 2. Though this clearly

---

5 You will notice that we are assuming some unique initial endowment though it might be contested that each disputant perceives a distinct endowment to which it has claims. This is merely a semantic issue, and we will consider this no different than the case where individuals really just demand an excess amount of a particular good relative to what is available.

6 Some mediators even avoid making explicit (nonbinding) suggestions for outcomes, though this is not universally true (Wall et al., 2001; Holley, Jennings, and Wolters, 2001).
oversimplifies the job of a mediator, the point is that the variety of tactics that mediators might
employ has the basic objective of altering the negotiators’ trade-off rate to bring about
“agreement” equilibrium.

It sounds simple enough to state that mediators need do nothing more than change the
relative price among bargaining issues. Of course, this analytical framework can also highlight
the difficulties that might arise in successfully mediating a dispute. First, the larger the change
needed in the relative price, the more difficult will likely be the job of the mediator. One would
hypothesize that the failure rate of mediation and/or the time required to mediate a dispute are
increasing in the distance between positions on an issue (i.e., the extent of the excess demand),
ceteris paribus. Wall et al. (2001) offers some evidence in support of this hypothesis in noting
that higher settlement rates are found in mediations of elementary school student disputes versus
difficult international disputes. This is consistent with the assumption that excess demand of key
issues is greater in international disputes or that it is more difficult to alter the relative price for
negotiators’ in international disputes.

One might wonder whether excess demand for all items might occur. This is not possible
in the Edgeworth Box framework with a unique initial endowment and terms of trade—a
nonequilibrium relative price will always generate excess supply of at least one good when
prices are positive and preferences are well-behaved. In other words, mediators must always be
able to identify the issue(s) for which there is excess supply in order to successfully mediate. In t
the event that negotiators also dispute over what the initial endowment is, then the mediator must
first align beliefs of what the starting point is before moving forward in mediation. For

---

7This would obviously be the appropriate order of the two objectives since establishing the correct price
ratio without first unifying the initial endowment will just imply that each individual demands a distinct point on the
Pareto set (i.e., continued dispute).
example, in complex international negotiations a “single-negotiations text” (SNT)—an initial proposal by third party interveners—is often used as a starting point for negotiations (see Raiffa, 1982, for a more thorough description and extended examples). Such a SNT is not meant to be a serious contender for final settlement, but through the negotiators’ criticism of the SNT, mediators can gain useful information about bargainer preferences. Trade-offs can then be suggested by the mediator in successive attempts to align supply and demand into general equilibrium.

A mediator faces added complexity when a dispute includes a multitude of issues. Nevertheless, it is clear that a primary task of the mediator is always to change relative prices—increasing the perceived price of items for which there is excess demand. The existence of multiple options for swapping and trading issues on the bargaining table, though apparently adding complexity, may ironically be advantageous to the skilled mediator who can alter the price ratio by facilitating and highlighting creative trades among multiple issues.

Before continuing it is worth pausing to ask whether or not evidence supports the notion that mediators work towards changing the trade-off rate of issues on the bargaining table. In a recent survey of the literature on mediation Wall et al. (2001) notes a large variety of tactics that might be employed by mediators. Among those of interest for this paper include the following: information provision, pressure tactics, threats, and even monetary compensation. Some of these tactics are culturally specific, and Western cultural does not usually empower mediators to use pressure tactics (Wall and Stark, 1998). This implies that the encouragement of concessions, creative packaging of trade-offs, or information provision are relatively more important tactics for U.S. mediators. However, it is noteworthy that Eastern mediators make frequent use of threats as they are empowered by their society to do so (Abu-Nimer, 1996). Furthermore, there is
evidence that some Eastern mediators literally compensate one or both negotiators either from their own resources or from community funds (Murray, 1997; Wall and Callister, 1999), which highlights some fairly explicit ways to alter the relative price of bargaining issues. Greig (2001) also notes the importance of using outside resources for mediation success in international dispute resolution, and so this more blunt approach to altering the terms-of-trade is not that uncommon.

A final example worth noting is that of the U.S. mediation efforts over the Israeli-Palestinian conflict. The U.S. has mediated the conflict between Israel and Palestine for years, and the two key issues can be identified as security (relatively more important in Israel's preferences) and land (relatively more important in Palestinian preferences). The U.S. has, in fact, contributed much of its own resources to "sweeten the deal" and hopefully achieve agreement among these negotiators. As noted before, one could view the addition of such outside resources as part of the mediation efforts to alter the trade-off rate between security and land in the conflict. With excess demand for land in the current conflict, the provision of arms and weapons to Israel effectively and explicitly lowers the price of security relative to land in Israel's negotiations with the Palestinians. This also implies a relative increase in the price of land, which can be viewed as a Walrasian auctioneer technique that is hoped to bring the two sides closer to agreement. Of course, the likelihood of success in these particular mediation efforts depends a great deal on the Israeli and/or Palestinian willingness to trust the mediators fully and accept new trade-off rates over the bargaining issues.

In many international disputes, mediation is conducted not by a disinterested outsider, but rather by individuals with a stake in the outcome. When such stake-holders actually inject

---

8 Raiffa (1982) gives the example of the Camp David negotiations between Israel and Egypt where a SNT was used along with U.S. mediation pressure and sweeteners for achieving agreements.
resources into mediation efforts, rather than view this as a way of altering the relative price of issues, one could alternatively this as expanding the dimensions of the Bargaining box. In this way the mediator alters the location of the contract curve. This is analogous to an increase in a factor of production as discussed in Rybczynski (1955). By expanding the dimensions of the Bargaining box, in addition to affecting trade-off rates by means of other mediator tools, the mediator helps push negotiators towards certain outcomes. This has the potential to significantly complicate the analysis because international negotiators may come to expect an infusion of resources as part of the dispute resolution process. If this is the case, then the mediator becomes part of tri-lateral negotiations with the disputants. In our initial analysis, however, this view of mediation is not inconsistent with the reality of international mediation where major power mediators can and do bring sizeable resources into mediations efforts, and such resources are often seen as key to successful mediation (Greig, 2001). These stakeholders who sweeten the deal with outside resources are attempting to partly facilitate a settlement, and partly facilitate a settlement acceptable to the mediator.

It is clear that mediators employ several different tactics that can be used to effectively change the relative price ratio in negotiations, and in some cases to actually alter the location of the contract curve. This is most apparent in the case where a mediator monetarily compensates one or both negotiators. Information gathering/provision, though not as blunt of a tool, can also be used to highlight aspects of certain trade-offs that effectively alter the terms of trade. The more complicated the negotiations, the more difficult it may be to accomplish the objective of altered terms of trade, but the fact that many of the tools used by mediators can be seen as creative attempts to alter the relative price in negotiations lends support to the Walrasian auctioneer perspective on mediation.
3. Implications

By analyzing negotiations as an exchange economy and mediators as Walrasian auctioneers, there are several implications worth noting.

**IMPLICATION 1:** Successful mediation leads negotiators to a Pareto efficient agreement.

This follows from our assumption that the mediator’s basic task is to call out the correct relative price. This restatement of the first welfare theorem is quite a forceful endorsement of mediation. For a given initial allocation of issues (and well-behaved preferences, etc.), there is precisely one relative price that will generate general equilibrium, and this equilibrium will be on the contract curve of Pareto efficient outcomes. This result does assume that negotiators are “price takers” in the sense that they trust the mediator and take mediation suggestions as given. Noncompetitive behavior would imply that bargaining power would be an important part of any settlement. Note, however, that this result does not depend on the mediator having complete information on the negotiators’ preferences. Mediators must simply alter trade-off rates in response to revealed excess demand for bargaining items.

**IMPLICATION 2:** Mediators can guide negotiators towards desired outcomes when outside resources are utilized.

This second implication is quite interesting in that it suggests that mediators might exploit the fact that they may prefer some outcomes over others. Of course, this suggests a non-neutral mediator but, as noted before, certain mediation efforts the choice to involve an outsider with a

---

9 Nickles and Hedgespeth (1991) find that mediator techniques are more effective when bargaining power is relatively equal among negotiators.

10 Joyce (1998) studies the Walrasian tatonnement process in a laboratory setting and finds that subjects underreveal demand in an attempt to manipulate price in tatonnement auctions. Nevertheless, it is noted that symmetric under-revelation would not affect the equilibrium trading price. Even though this study involved numerous subject suppliers and demanders and is therefore not directly analogous to bilateral negotiations, the potential implications on strategic or tactical asymmetry of the negotiators is quite intriguing.
stake in the outcomes is seen as necessary, especially in international mediation. Whether guided by self-interest, or by notions of distribute justice, fairness, etc., a mediator who can alter the dimensions of the bargaining box can exercise some discretion over negotiated outcomes. This may help explain behavior in international mediation where stakeholders mediate while often adding their own resources to help guide outcomes in a particular way.

It is worth noting that, though the “correct” price ratio will guarantee a Pareto efficient agreement, mediation might still be considered successful by other criteria. One might argue that any agreement indicates successful mediation. In fact, any voluntary agreement by both negotiators would have to be a Pareto improvement. Such an agreement, even if not a Walrasian equilibrium, would be considered some measure of success. However, a non Pareto efficient agreement, which is likely to be the entitlement or endowment of items for future negotiations, may plant the seeds for future dispute. Some may even argue that if disputants are brought closer to agreement, then this implies a measure of success of the mediation process, though clearly less so than when a voluntary settlement is procured.

4. Mediation Versus Arbitration

Implications of this analysis can also highlight important distinctions between mediation and another commonly used form of ADR. The primary distinction between resolving disputes with arbitration versus mediation is that arbitrators dictate a binding settlement, whereas mediates do not typically have authority to impose a settlement. An arbitrated settlement of a dispute can therefore be viewed as the imposition of any particular point within the Edgeworth Box in Figure 3. One item immediately stands out: An arbitrated settlement will not be Pareto efficient, in general. Of course, an arbitrator may choose to “split-the-difference” between the negotiators’ final positions as some have hypothesized, but this still does not imply a Pareto
efficient outcome. Consider the following version of arbitration that is commonly used in practice: conventional arbitration.

Conventional arbitration (CA) allows the arbitrator to impose a binding settlement, which implies imposing a point inside the Edgeworth box. Certain points are more likely to be chosen by the arbitrator than others, but empirical evidence is consistent with a certain randomness of arbitrator settlement preferences such that one can view arbitrated settlements as draws from a random number distribution (see Ashenfelter, 1987; Ashenfelter and Bloom, 1984). Of course, the measure of success in arbitration may be that arbitration is not invoked (Stevens, 1966). Given the uncertain nature of arbitrated outcomes, risk averse negotiators may willingly negotiate lesser settlements than under risk-neutrality in order to avoid the arbitration “lottery” (see Farber and Katz, 1979). Nevertheless, it is clear that once arbitration is invoked, though this may be considered a failure in the institution of arbitration, the outcome need not be a Pareto improvement.

Consider that arbitrator settlements are dictated by a bi-variate distribution over \( x_i \) and \( x_j \) that reflects the uncertainty of arbitrated settlement over the bargaining issues. One could then explicitly calculate the probability of a Pareto inefficient outcome from the conventional arbitration process. Specifically, let \((\tilde{x}_i^a, \tilde{x}_i^b)\) be the endowment level of issues 1 and 2 for disputants \( i = 1, 2 \), \((\bar{X}_1, \bar{X}_2)\) is the total availability of each item defining the dimensions of the bargaining box, and \( x_i^a + x_i^b = \bar{X}_i \) for \( i = 1, 2 \). Define A to be the set of all points \((x_i^a, x_i^b)\) such that \( U_a(x_i^a, x_i^b) \geq \tilde{U}_a(\tilde{x}_i^a, \tilde{x}_i^b) \). Similarly, define B to be the set of all points \((x_i^b, x_i^b)\) such that \( U_b(x_i^b, x_i^b) \geq \tilde{U}_b(\tilde{x}_i^b, \tilde{x}_i^b) \). Then set \( P = A \cap B \) formally defines the Pareto improving region, which is a subset of \( R^2 \)-space (highlighted in Figure 3). The probability of arbitration producing a Pareto improving settlement, where arbitrated settlements are drawn from the distribution.
$f(x_1, x_2)$ is $\int\int_{\mathcal{P}} f(x_1, x_2) dA$. So, the probability of an inefficient arbitrated settlement is given by $1 - \int\int_{\mathcal{P}} f(x_1, x_2) dA$.

For a truly accurate representation of the trade-offs of mediation versus CA one must take into account the fact that mediation will not succeed (in producing a Pareto efficient settlement) 100% of the time. It would be difficult to characterize the probability of success in mediation given the variety of factors that are important to successful mediation. However, failed mediation at least leaves the bargainers with their initial endowment, and so the outcome is still (weakly) part of the Pareto set. If failed mediation implies the endowment outcome, and failed arbitration is seen as invoking the arbitration procedure (see Stevens, 1966, for an argument on how successful arbitration procedures are those not invoked), then it is a useful reference point to compare the probability of a Pareto-worsening CA settlement to an outcome that leaves the parties no-worse off. At worst, failed mediation implies continued negotiations or bargaining impasse, but mediation does not mandate an outcome that would be unacceptable to someone. This highlights the trade-off between arbitration and mediation quite clearly in those cases where either procedure does not generate a voluntarily negotiated settlement: arbitration at least guarantees a mandated settlement, but only with a positive probability that it is unacceptable to one or both bargainers.\textsuperscript{11}

5. Discussion

The preceding analysis of mediation considers a simple negotiations case that may not

\textsuperscript{11}Another type of arbitration, known as final-offer arbitration (FOA) constrains the arbitrator to choose one of the bargainer's final package offers. A less constrained version of FOA utilized by some state jurisdictions allows the FOA arbitrator to final-offer select among individual bargaining issues. Neither of these types of FOA rules alters the main result with respect to CA outcomes. A binding outcome that makes one or both bargainers worse off will still occur with positive probability.
seem to capture the flavor of real world negotiations and/or mediation. The criticism would equally apply to general equilibrium theory as a whole. There is a powerful message to convey in noting that the complexities of mediation can be simplified to a basic task of altering terms of trade to promote general equilibrium. This is the job of the Walrasian auctioneer as economists know it. Nevertheless, certain assumptions that have been implicit to this point are worth noting, as they are suggestive of where this work can be extended.

First, we do not assume that negotiators gain utility directly from mediation, but evidence suggests that negotiators sometimes gain satisfaction from the process itself (Depner et al., 1994). Similarly, mediation itself might generate a positive externality. For example, Kitzmann and Emery (1994) argue that children are shielded from hostile conflict in custody mediation, and gang mediation has been observed to provide middle-school students with safer schools (Tabish and Orell, 1996). If positive externalities are generated to those external to the mediation itself (e.g., the entire community benefits from lower crime rates or domestic dispute incidents due to community mediation programs), then mediation will be relatively underutilized compared to what would be socially efficient. An additional benefit to bargainers of utilizing mediation or any ADR procedure is that neutral third-parties can be used as scapegoats so that one or both bargainers may “save face”. The ability to blame outcomes on mediators can be a valuable and necessary option in negotiations and such a function of mediation helps lower the cost of commitment and voluntary settlement among negotiators.

It is clear than many simplifying assumptions have been introduced for the purpose of initially examining general equilibrium theory’s potential contribution towards understanding mediation. I believe that such simplification is useful and necessary in order to illuminate the process of mediation for what it is: an exercise in facilitating general equilibrium. While the
Walrasian auctioneer is assumed to effortlessly know excess supply and demand in an exchange system, the mediator must employ a set of skills to gain trust and information about the initial state of the bargaining exchange system. At this point, facilitating settlement implies an objective of correctly altering the terms of trade over a potential multitude of issues to eliminate excess demand and bring about a voluntary equilibrium outcome. The parallel of this with the tâtonnement process of exchange theory is evident. Once mediation is cast in the light of an exchange economy, economic analysis can bring much more to bear on this widely-used, but under-analyzed, ADR procedure.
References


FIGURE 1  
Excess Demand for Issue #1 (i.e., dispute over issue #1)

Budget Line (slope is perceived relative price of issues)

A's Indifference Curve

B's Indifference Curve

Endowment

FIGURE 2  
Mediated equilibrium is Pareto Efficient

Mediator succeeds by increasing perceived price of issue #1

Endowment
FIGURE 3
Arbitration's inefficiency

Arbitrator Mandates a settlement—outcome may be Pareto Inefficient

contract curve

Pareto Set (P)

Endowment (E)