Columbia University

Department of Economics Discussion Paper Series

The Economics of Relational Contracts
A Tale on Three Prices: Economic Price, Trade Price and Contract Price

W. Bentley MacLeod

Discussion Paper No.: 1314-23

Department of Economics
Columbia University
New York, NY 10027

November 2014

The Economics of Relational Contracts

A Tale on Three Prices: Economic Price, Trade Price and Contract Price*

W. Bentley MacLeod
Columbia University, NBER and IZA

November 4, 2014

Columbia University
Department of Economics
420 West 118th, MC 3308
New York, NY 10027-7296
USA

*This paper is prepared for the *Annual Review of Law and Social Science.* I am indebted to Gillian Hadfield for suggesting this project and especially Lisa Bernstein and Ron Burt for providing extensive comments. Geng Tong provided very able research assistance.

Abstract

The legal scholarship on relational contracts highlights the fact that commercial transactions rely upon a large number of institutions, including trade norms and the good reputation of industry participants. This complexity is in contrast to the simple models that are often used in economics analysis of the law, leading Macauley (2002) to suggest one can view "law and economics as a desert, and law and society as a swamp". The purpose of this paper is to show that the economic analysis of relational contracts touches upon several elements of modern micro-economics that can be distinguished by different meanings of the term "price" . The term "economic price" refers to the true resource cost of a commodity, and can explain the role of standards setting by trade organizations. "Trade price" refers to terms of trade, but can be distorted due to asymmetric information. This effect may be mitigate via reputational mechanisms. Finally, "contract price" refers to contingent prices such as warranties, as well as legally enforceable agreements for which courts can be asked to impose damages where there is contract breach.

1 Introduction

The purpose of this essay is to briefly review current themes in economics that are relevant for the literature in law on relational contracts. The literature on relational contract can be traced back to at least Karl Llewellyn's work on the U.C.C. (Uniform Commercial Code).[1] A central issue is the extent to which courts should use business norms and practices in the adjudication of contract disputes. Subsequent work by Stuart Macaulay (1963) and Ian MacNeil (1974), members of the Law and Society movement, emphasized the value of a holistic approach to contract law. Both Macaulay and MacNeil advocated the view that courts should take into account the larger societal values when adjudicating cases. The result has been a lively ongoing debate on how the courts should adjudicate contract cases.

[1] See Bernstein (2014a) for an excellent discussion. See also Llewellyn (1930) for discussion on the meaning of "law".

In addition to the law and society movement, relational contracts and the issue of how to adjudicate contract disputes have been extensively studied by scholars in the law and economics tradition, such as Alan Schwartz (1992) and Richard Craswell (1993).[2] This work, as exemplified by Posner (2011)'s treatise on law and economics, uses economics to provide a unified approach to thinking about and organizing the law. The two approaches are often viewed as providing contrasting approaches to a similar set of issues. The difference is beautifully expressed by Stuart Macaulay (2000) who cites a talk by Robert Ellickson, who in turn cites Leff who viewed "law and economics as a desert, and law and society as a swamp".[3] While hopeful of a middle ground, Macaulay (2000) goes on to argue that rational choice models and game theory lead to an over-simplification that does not reflect the reality of many concrete situations.

It is true that rational choice theory and game theory are central preoccupations of many economic theorists. However, it is not central to the problem of economics that is broadly concerned with efficient allocation of scarce resources. In contrast, contract law, and by extension relational contract law, is concerned with the core economic question of ensuring the effective production and exchange of goods and services. Macneil (2000) argues that "understanding a transaction requires understanding all essential elements of its enveloping relations." Given that exchange takes place in a market economy where the prevailing prices help determine the terms of trade, MacNeil's position implies that in order to understand relational contracts, we need to understand the role of prices for the allocation of resources.

The term "relational contract" in economics has come to mean the narrow problem of modeling bilateral trade in the context of a repeated game.[4] Yet, it is evident that many of the issues that concern scholars, such as Hadfield

[2]See Hermalin et al. (2006) for an excellent review of how economics can be used to inform contract law.

[3]Macaulay (2000), page 783.

[4]Bull (1987) and MacLeod and Malcomson (1989) are often credited with starting this trend. Bull (1987)'s work relies upon the repeated game model developed by Kreps et al. (1982), while MacLeod and Malcomson (1989) build upon the work of Abreu (1988) to provide a complete characterization of all the possible equilibrium contracts. Recently important work includes Levin (2003) and Chassang (2010).

(1990) and Bernstein (1992), concern not only relationships, but also the nature of the good and services to be governed by the relationship. In this essay I outline the "economic" approach to economic institutions at a basic level and introduce to a broader audience some of the "inside baseball" of the field of economics.[5] We call this "insider economics", and suggest that understanding these issues has become increasingly important in a global economy where decisions based upon the advice of economists can have far reaching repercussions.[6] The essay begins with a discussion of the role of models in economics, and then focuses attention to the notion of "price" and how confusion over what it means has not only led to a breakdown of communication between disciplines, but also has, in my opinion, led to some poor policy making.

The central issue can be traced back to Friedman (1962)'s book on how free markets may lead to better economic performances. For its time, it was an excellent book that built upon the developments in general equilibrium theory, particularly the two welfare theoremsdeveloped by Arrow, Debreu and MacKenzie in the 1950s.[7] As I discuss in more details below, these results are central to modern economics and provide a normative benchmark that is used to organize vast amounts of economic data. They show that there is a close connection between prices in a perfectly competitive market and

[5]As Wikipedia states, "inside baseball" is a metaphor that "refers to a detail-oriented approach to the minutiae of a subject, which in turn requires such a specific knowledge about what is being discussed of which the nuances are not understood or appreciated by outsiders."

[6]See for example Madrick (2014)'s book that makes this point. As Paul Krugman indicated in his review of the book on September 25, 2014 in the New York Times, the points are not really new. For example Kornai (1971) pointed out many problems with the standard theory.

[7]See the Nobel prize statement `http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1983/presentation-speech.html` for Gerard Debreu that places their contribution into context. Notice that Friedman never explicitly cites general equilibrium theory. However, some of his ideas do seem to have been written in the shadow of the theory. From example, the second welfare theorem states that every efficient equilibrium can be achieved with the combination of a reallocation of initial endowments and a competitive market. This is basically Friedman's solution for the provision of education using a voucher system - the vouchers addressed the problem of access for the poor, while the market would ensure the efficient allocation of the educational resources.

the efficient allocation of resources. The difficulty is that "price" in general equilibrium theory is very different from "price" in Friedman's book, and hence Friedman's claims do not follow from the general equilibrium theory, but they are an *empirical* claim that free markets are the best way to manage a large complex economy.

Like Friedman, relational contract theorists also make empirical claims - for example arguing that courts should take into account industry norms when adjudicating a contract. Thus, I begin by discussing what we mean by an empirical claim, and observe that such claims necessarily rely upon some models of the world that are either explicit or implicit, and always unprovable. Section 2 of the essay introduces the notion of causality that is widely used in economics, as beautifully exposited by Holland (1986). Holland explicitly makes the point that empirical claims cannot be made in the absence of some theory. His solution, commonly known as the potential outcomes approach, provides a way to systematically explore and evaluate different theoretical models of the world. It has revolutionized the way empirical work is done in economics.[8]

The quote from Macaulay regarding law and economics also illustrates that economic models are often considered simplistic, and thus necessarily false.[9] It is worthwhile reminding ourselves that *all* models are false. Models are simplified representations of the environment that assist us in making better decisions.[10] In general, a simple model is preferred to a more complex model because it is easier to understand and explore empirically. Complexity is added in response to the need to better fit the data, which, hopefully, leads to better decisions in the future.

The second goal of the essay is to show that the notion of "price" as it is commonly used is not sufficiently rich to capture its various uses in

[8] See Angrist and Pischke (2009) for an excellent up-to-date review of this approach.

[9] See Peierls (1960)'s discussion of Pauli who observed that models in physics are also wrong (but useful)!

[10] Notice that one can always transform a model about the physical world into a decision as to whether a statement is true or false. Even in physics false models are widely used. Newtonian physics is widely used in engineering because the increase in accuracy by including relativistic corrections is simply not worth the effort for most applications.

practice. One can usefully distinguish between at least three notions of price in economics, each with different properties. In his comments on an early version of this essay, Ron Burt has kindly called the paper a Rosetta stone between the two disciplines of law and economics.[11] I prefer to view the exercise as doing what empirical people call a "crosswalk" between two data sources/disciplines.[12]

Section 3 provides an in introduction to general equilibrium theory. It provides some general conditions under which competitive equilibria are efficient. I call the prices that support efficient allocations "economic prices". Many economic models, particularly macro-economic models, rely upon economic price and the associated hypothesis that markets are complete. To distinguish between the "economic price" in a model, and the price that is observed in the market, I call the latter the "trade price".

Section 4 introduces the notion of the "trade price" which corresponds to our everyday notion of the price observed in a market. If the "trade price" corresponds to the "economic price", then it should reflect the underlying cost of the resource. Over long periods of time, prices do in general vary with resource costs. However, over shorter time scales this is often not the case.[13] A good example are prices in health care markets which seem to bear no correspondence to the underlying resource costs.[14] Another example are financial markets. As Shiller (2014) observes, asset prices are the result of people holding a portfolio of beliefs regarding how the future will evolve, and hence they cannot be expected to always reflect true future resource costs

[11] Burt made this comment at the Reputation Symposium, on September 4, at Pembroke College, Oxford, UK. This is consistent with the goals of this journal, that since its publication in 2005, "strive to enhance the understanding of the complex connections between law, culture, social structure, and society by focusing on social scientific studies of law and law-like systems of rules, institutions, processes, and behaviors." (`http://www.annualreviews.org/journal/lawsocsci`, retrieved September 1, 2014).

[12] The formal term is "schema crosswalk" that describes how to map between two data bases. See `http://en.wikipedia.org/wiki/Schema_crosswalk`.

[13] Another bait and switch strategy in economics is to go from the true result that competitive equilibria are efficient when markets are complete, to the claim that more markets are likely to make the economy more efficient. Oliver Hart (1975), in his Princeton PhD thesis, showed that this claim is incorrect.

[14] See Skinner (2012).

that they are meant to represent.

The point I wish to make here is that "economic price" is a (useful) theoretical concept to characterize efficient allocations. It also helps us understand when competitive markets are *not* efficient in practice, which in turn provides a theoretical starting point for why economic institutions (and relational contracts) are needed. The notion of "trade price" is used in Akerlof (1970)'s famous market for lemons paper. He argued that many observed economic institutions arise because the "trade price" does not reflect the true underlying characteristics of a good. He observes that sellers solve this problem by developing reputations for providing high quality goods. Beginning with the work of Kreps and Wilson (1982) and Shapiro (1983), this idea led to a large economics literature on how individuals and firms build reputation in markets, and the implications of this for market performances.

A key feature of this class of reputation models is that parties choose to provide high quality products because of the impact upon future demand. In the context of MacNeil (1974)'s work on relational contracts, this corresponds to what he calls the "non-promissory" future of contract. He observes that this is a complex phenomenon, which is certainly the case, as one can see from the book length economics treatise on the subject by Mailath and Samuelson (2006). MacNeil identifies a second class of relationships that he calls the "promissory future of contract", in which parties make explicit promises today to carry out actions and transfers in the future. Akerlof (1970) observed that such agreements in the form of warranties or other contractual tools also provide a solution to the problem of efficient trade when product characteristics are unobserved.

Section 5 introduces the notion of a "contract price" that is intended to cover these sorts of arrangements. Within economics, the theory of relational contract is typically confined to "contract prices". This illustrates the fact that "relational contract" in economics is a much narrower in conception than the term used by legal scholars. The distinction between a trade price and a contract price also illustrates different dimensions of individual reputation. When using a trade price, a seller's reputation is associated with the quality of the good to be produced. In contrast, with a contract price, reputation is

associated with whether or not individuals keep their promises and remediate problems that arise (See Banerjee and Duflo (2000) for evidence regarding the latter effect). The paper concludes with a summary of the arguments and some implications for economic and legal policy making.

2 Causality and Explanation - The Rubin/Holland Model[15]

When an adviser recommends policy A over policy B, she is predicting that the future consequence of A is superior to B. How can she know this? In the context of relational contracts, there are many examples of authors who make predictions. Hadfield (1990) advises courts to take into account how franchise contracts create commitment.[16] Bernstein (1992) wishes to explain why diamond dealers have chosen informal (A) over formal enforcement (B).[17] Schwartz (1992) addresses the puzzle of why in some cases the courts enforce contract terms as written (a passive strategy), while in other cases they may not enforce clear terms, or add terms that were not in the original contract.[18]

In each of these cases, there is the outcome that is observed to have occurred, and the *potential* outcome that did not occur. In every case, either the case observed was predicted to be better than the counter-factual (and hence explain why the decision was made), or the counter-factual decision would result in a better outcome. This way of thinking about decision making has been formalized by Donald Rubin, and popularized by Paul Holland (1986)..[19]

The basic approach is a generalization of ideas developed for the testing of drugs. In that case, one compares the outcomes between individuals who are treated with a drug and those who are not. More generally, one begins

[15] This section is based in part upon chapter 2 of my book, *Beyond Price Theory.*

[16] Page 930.

[17] Page 115-116.

[18] Pages 271-272.

[19] Angrist and Pischke (2009) provide a very accessible review for social scientists, while Imbens and Rubin (2011) provide a more theoretical development of techniques. See Ferguson (2008) for an application of these ideas to historical analysis.

with a unit, i, that is being treated - it might a person, a company, a judge, court of law, or country. The unit must then face at least two possible treatments or decisions, which we can denote as A or B. It could be a rule for gaps filling a contract or choosing between a court and arbitration. The final step is to specify the *potential outcomes* $Y_i(A,t)$ and $Y_i(B,t)$ - these are the outcomes that might occur after each decision. Notice that I have added a time index to highlight the fact that the potential outcomes are intended to occur at specific point in time.

The causal effect of decision A relative to decision B is defined by:

$$CI_i(A,B,t) = Y(A,t) - Y(B,t).$$

The causal effect of A is the difference in outcomes relative to B. The first point is that one cannot talk about a cause, without also specifying the outcome if the cause is not present. This seems like a simple point, but in practice it can be quite challenging to specify carefully what may have happened if a decision did not occur.

Notice that the definition requires comparing A and B *at the same time!* In order to measure $CI(A,B,t)$ one would have to first try option A, and then enter into a time machine, go back one period, and then try option B. Holland (1986) calls this the "fundamental problem of causal inference". This idea of learning from counterfactuals was immortalized in the film *Groundhog Day* in which our hapless hero, Phil Connors played by Bill Murray, would keep reliving groundhog day in Punxsutawney, Pennsylvania, until he worked out how to deal with his personality and connect with the heroine of the movie, Katie, played by Andie MacDowell.

What is so important about the approach is that it forces one to be explicit about regarding the assumptions underlying a causal claim. For example, in the case of a drug trial, one uses what Holland calls the hypothesis of *unit homogeneity* - the effect of treatment should be the same upon units with similar characteristics. For example, to test a drug one may administer the drug to one of two ill individuals. Notice that it is possible that the treated person would have lived even without treatment, and hence observ-

ing the untreated die does not logically imply that the drug saved the treated person.

In order to come to this conclusion one needs a model, only a simple model. For example, if the persons are identical twins, then it is reasonable to suppose that they have similar biology, and hence the treatment is effective for both of them.[20] The case of drug trials is pretty transparent. The potential outcomes approach is also useful for helping us understand policy making in more difficult situations. For example, there is the claim that human activity is *causing* an increase in global temperatures. Here the unit is the world, and the treatment is the production of CO_2, and the outcome is temperature. In order to really test this claim we would need several worlds and then try the experiment of varying CO_2 output in the different worlds. This is clearly impossible.

In science, the implicit assumption is that the laws of nature are time invariant. This assumption, combined with detailed models of the climate, is used to assess the impact of CO_2. The impossibility of doing a randomized trial and the complexity of the modeling exercise explain why there is so little consensus regarding the appropriate policies for climate change.

One faces similar difficulties when studying relational contracts and the law. The most convincing work on the effect of the law uses the United States as a test laboratory, where changes in state laws can be used to measure the effect of the law upon outcomes.[21] Examples include Donohue and Levitt (2001) who use variation in abortion law to look at its effect upon crime, Kessler and McClellan (1996); Currie and MacLeod (2008) study the effect of variations in state tort law upon medical outcomes, while Miles (2000), Autor et al. (2004) and MacLeod and Nakavachara (2007) use state variations in employment law to study its impact upon employment and wages.

The explicit assumption in these studies is that the outcome variables move continuously over time. One then looks to see if there is a discrete

[20] A more realistic example is one in which a large sample is used. In that case, one assumes that sample population has similar characteristics to the whole population, and hence the difference in outcomes is representative of themean outcome when a person is chosen randomly from the whole population.

[21] See Bertrand et al. (2004) for a discussion of the best way to use state variation.

change in outcomes at the time the law is changed. It may always be the case that the law changed in *response* to some other factors, as in Krueger (1991). The challenge is to make modeling assumptions that can reasonably stand the test of time.

Finally, in response to Macaulay's comment on the desert of law and economics, one is reminded of the point made by Popper (1963) in which one cannot prove some hypotheses to be correct, but can only prove some hypotheses to be false. One reason for the use of simple models in economics is that we can learn as much, if not more from the failures of a model, as from its successes. In this spirit we move on to the notion of economic price and how it fails to explain the prices observed in a complex economy.

3 Economic Price

The fundamental theoretical building block of modern economics is general equilibrium theory developed by John Hicks, Kenneth Arrow, and Gerard Debreu, who all won Nobel prizes in economics for their work. The theory, laid out beautifully in Debreu (1959)'s *Theory of Value*, provides a clear definition of an efficient allocation of resources, and conditions under which such an allocation can be achieved via the price system. The theory is the corner stone of a modern graduate education not because it is true, but because it provides a general framework within which it is possible to define what one means by an efficient allocation of resources.[22] There are no normative presumptions beyond requiring that each person has a way to evaluate the allocation of resources. The purpose of this section is to explain what is a "price" in general equilibrium theory, and to give it the more specific name of "economic price". I shall also show that some of the institutions that Lisa Berstein (2001,2014) has observed in her work on the cotton industry and the U.C.C. can be viewed as the creation of commodities, which in turn allows for the use of "economic price".

[22]Here the term *efficient* is always in the sense of Pareto efficiency - there is no other allocation that makes everybody as well off, and some people strictly better off. This is discussed in more details below.

Commodities

A commodity can be a good or service. The former is a tangible object, such as food. A service would be a commodity that cannot be physically owned, such as the stream of images one views while watching a movie. In this setup, an *asset* would be some property that provides a stream of services. For example, a pair of shoes is not a good, but an asset that provides services to one's feet. The distinction is meaningful because at some future point the service might be used by one's children (my son sometimes borrows my shoes). The services provided by asset can be contracted upon and delivered to different individuals over time.

The description of a commodity requires specifying the quality of the commodity, the place, and time of consumption. In addition, uncertainty can be introduced by allowing the commodity to be state contingent. For example, one might buy a particular type of wheat on the Chicago futures exchange to be delivered next year. In addition to carefully specifying the characteristics of the wheat to be delivered, the contract will also specify what will happen if delivery cannot occur. All these features can be viewed as characteristics of the good.

Debreu (1959)'s definition is so strong that observed markets rarely, if ever, trade or exchange commodities in the sense used in general equilibrium theory. This fact is rarely discussed in undergraduate economics courses.[23] The notion of a commodity is central to the notion of what is a business norm. For example Bernstein (2001) discusses how trade norms evolve to precisely define "cotton" as a commodity. Bernstein (2014b) also has a wonderful discussion of a "2 x 4" - the piece of lumber that is not in fact 2 inches by 4 inches, but over time the exact size became standardized.

Once the set of commodities has been defined, general equilibrium theory then adds production possibilities - a description of the commodities that

[23] Undergraduate courses do discuss imperfect markets, and specialized topics such as the monopoly problem and principal-agent theory. Neither of these problems would be severe if commodities were well defined. For example, monopolies are inefficient because they cannot price separately goods delivered to different persons - see the general analysis in Bergemann et al. (2014).

can be produced with the available endowments of capital and labor. In the model, labor is just another service that is purchased on a market, and hence the production set is a process that takes services from assets such as labor and capital to produce new commodities.

Value

The next ingredient is a model of human decision making. The model of rational choice is a common target for criticism, as in the quote by Macaulay illustrates. However, its power lies in the fact that it is a very simple and elegant model of decision making. It is built upon two assumptions. The first is that individuals have a well defined ranking over commodities. Without loss of generality, one can begin with a finite set of choices, $\{A, B, C, D, ...\}$. The second assumption is that if an individual prefers A over B then she will choose A. A person is considered *irrational* when she knowingly chooses say B, even though she really prefers A.

Debreu (1959) shows that under these assumptions, choices of a rational person can be represented by assigning a value to each choice, say V_{choice}. It will be the case that choice A will be preferred/chosen to some other choice B if and only if the value of A is greater than the value of B ($V_A > V_B$). The rational choice model is the starting point for using what Bandura (2001) calls the *agentic* approach to social cognition - the notion that individuals have goals and make decisions because of the consequence of these decisions.[24]

Once preferences have been defined, then the notion of an *efficient allocation* is defined as a feasible allocation (one that satisfies the resource constraints) with the feature that there is no other allocations that make a single individual better off without harming any other.[25] This notion of efficiency is typically considered to be ethically neutral from the perspective of individual preferences, and most economists would take the normative

[24]The term *agentic* is also used in the context of Milgram's theory in which how individuals follow orders are in an agentic state.

[25]The term "Pareto efficient" is more commonly used - there is really no other notion of efficiency that is used in economics, and hence we use the term "efficient". There may be other explicit criteria used to evaluate an allocation - these may or may not be efficient, depending upon the context.

view that, if possible, one should choose an efficient allocation. Under the standard assumptions for general equilibrium theory, efficient allocations can always be found, though they are in general not unique.

The purpose of the rational choice model is to provide a simple and coherent representation of how millions of individuals in an economy will respond to changes. It should also be noted that the model allows for interpersonal judgments. There is nothing in the theory that bars a person from choosing an outcome that is more equitable, even though it may lower her personal income. The theory also allows individuals to change their mind because a good consumed in the future is a different commodity. The strong assumption that is often made is not rationality, but the assumption that preferences are *time invariant*, namely if we could observe preferences today that will tell us what a person's preferences will be tomorrow.

Less well appreciated is the role of the rational choice model in modern behavioral economics. Before the work of Kahneman and Tversky (1979), there had been a great deal of work that attempted to model human decision from the ground up. A good example is the treatise by Newell and Simon (1972). The work had little impact in economics, even though it was widely recognized that the standard model needed to be extended. The genius of Kahneman and Tversky (1979) was to begin with the standard rational choice model and use it as a benchmark against which to measure *deviations* from rational choice, rather than attempt building a new model from scratch. This approach has been enormously influential because the rational choice model provides a good first order representation of behavior, and hence a good way to help organize the many deviations from rational choice that have been observed in the literature (See Camerer et al. (2003) for a collection of seminal articles). Next we turn to the theory of competitive markets, which, like rational choice theory, has proven to be a good first order model of economic activities.

Markets and the Welfare Theorems of General Equilibrium Theory

General equilibrium theory provides a model of resource allocation when the set of commodities in the economy can be observed and contracted upon. In this case, one can characterize all efficient allocations by giving each commodity in the economy a value per unit or a price.[26] This price is a purely technical construct that follows from the requirement of (Pareto) efficiency.

It turns out that there is a beautiful connection between these prices and the prices in a competitive market. By a competitive market one means a situation for which every commodity can be traded at a price, and that prices are such that demand is equal to supply. The first welfare theorem demonstrates that every competitive equilibrium is efficient. An obvious concern is that competitive equilibria may be extremely unjust. For example, Sen (1977) pointed out that one of reasons for the Bengali famine was not the lack of food, but the fact that many households did not have the resources to purchase food at the going prices.

These concerns are addressed with the second welfare theorem. Under the appropriate conditions for every efficient allocation, there is a redistribution of initial endowments, so that the efficient equilibrium is also a competitive equilibrium. This is a very powerful idea that, as we have mentioned, can be viewed as consistent with many of the ideas in Friedman (1962). He makes the normative claim that a society with free markets is to be preferred over the alternatives. He recognizes the importance of addressing inequality, and, consistent with the second welfare theorem, advocates a redistribution of initial endowments (such as vouchers for the provision of school services and a negative income tax system).

Gary Becker (1976) observes that the notion of price used in general equilibrium theory does not correspond to it's everyday use, and certainly does not correspond to "price" as used in a legally binding contract. Price as used in general equilibrium theory represents the value of any constraint

[26] One good has to be given a numeraire price of 1 against which all the others are measured.

upon the set of feasible allocations. When the price of a commodity is zero, then this means that there is more of the commodity than individuals are willing to consume. Similarly, at an efficient allocation, pollution that is produced is normally associated with a negative price - producing more of the commodity lowers value.

However, this does not imply that markets with free "prices" will achieve an efficient allocation, as claimed by Friedman (1962). The reason is that a prerequisite for efficient trade are complete markets, , so one can measure and price *all* commodities in the economy. Williamson (1979)'s influential work observes that transaction costs are an important market friction that make complete markets impossible.

To many this discussion may seem a bit pedantic, but general equilibrium theory is the intellectual foundation for modern economics. Even if not explicitly acknowledged, the idea that efficient allocations can be characterized via economic prices is very powerful. In the context of business practices, it shows that in principle, setting standards for goods and services in relationships makes it easier to price these commodities, and hence can potentially increase the value of trade.

Secondly it helps explain why so many economists, when acting as advisers, believe that more markets are good. For example, Greenspan (1998) very much supported unregulated over the counter (OTC) trade in derivative securities. He used a perfectly valid argument. The only problem was, as he later admitted, (Greenspan (2008)) it was completely wrong! In an important paper, Oliver Hart (1975) showed that making markets more complete does not necessarily result in increased efficiency, and thus in theory more markets do not necessarily lead to better outcomes.

Finally, one cannot easily escape the power of the second welfare theorem. It implies that given *any* normative claims regarding what is a desirable outcome can be viewed as an outcome supported by some "economic prices". This can tempt economists to use what Paul Krugman (2014) calls a "bait and switch" strategy - namely to go from the true fact that efficient allocations can be supported by some set of "economic prices" to the false claim that free markets are always efficient. To spot this strategy, we now turn to

providing a more nuanced notion of "price".

4 Trade Price

The notion of an economic price for a well defined commodity is quite different from what I call the *trade price.* This corresponds to the everyday concept of a price that refers to the observed terms of trade at the time of sale. When we speak of the price of milk or housing, it refers to a specific category of a good, but within that category there are many different commodities corresponding to different qualities and locations of consumption.

The reason this is important is that while economic price *always* refers to the actual value of a good, the trade price refers to the single market price for a *basket* of different commodities. For example, in his famous "Market for Lemons" paper, Akerlof (1970) considers the market for cars where they are characterized by their age and make, but the mechanical quality of the car for sale cannot be observed by buyers. The word "price" in Akerlof corresponds to what I mean by a trade price - the amount one would pay for a car in this market, but whose quality is uncertain. It is not the economic price because cars vary in their quality, and hence cars of different quality should have different economic prices. Akerlof showed that the trade price is equal to the average value of low and high quality cars. This in turn creates an incentive for owners of low quality cars to enter the market (adverse selection), while owners of high quality cars exit the market.

If consumers understand this, then they will reduce their total demand for cars, which, as Akerlof shows, can in some cases lead to a complete breakdown of the market. This paper is extremely influential in economics, because it illustrates the role that asymmetric information plays in determining the volume of trade. The assumed lack of a contract between parties is consistent with the notion of a *trade price* and with the way the law treats spot exchange. As Farnsworth (2004) observes, spot market exchange is not normally viewed as a legally binding exchange. When the quality of the good is not directly observable (as is the case is most complex consumer goods such as automobiles and computers), buyers rely upon their *expectations*

regarding the quality of the good.[27]

Akerlof goes on to discuss the solutions that parties have devised to encourage the production of high quality goods. One of the most important of these is the development of a reputation for quality, a point also made by Friedman (1962). The first formal economic model of product reputation is due to Klein and Leffler (1981). It relies upon the theory of repeated games that is the basis of the relational contract models in economics developed by Telser (1980) and MacLeod and Malcomson (1989). This approach is not without controversy. Shapiro (1983) explicitly argues that the Klein and Leffler approach is ad hoc.

Shapiro's point is that a reputation should be about a time invariant characteristic of an individual, good, or firm. Thus a firm is either good or bad, but that the signals of quality are not perfectly observed. A firm's reputation is formally the probability that they produce high quality goods. Repeated good experiences with a firm's product leads the market to update beliefs regarding the unobserved quality. In such market, reputations have a *selection effect.* Namely, bad firms get bad reputations and are weeded out of the market over time.

In contrast, relational contracts are based upon the existence of social norms in the market that firms choose to adopt or not. In the Klein and Leffler model, firms *choose* a combination of high quality and high prices that together form an equilibrium in which they do not have an incentive to cheat. Thus relational contracts are about equilibrium *incentives* rather than selection. MacLeod and Malcomson (1998) apply these ideas to labor markets and explicitly show that there is a close connection between social norms and equilibrium employment in labor markets.

We put off further discussion of relation contracts to the next section, and continue the discussion of trade prices using the notion of reputation as defined by Shapiro (1983). When reputations are about unobserved and

[27] Under the UCC, there is a requirement of merchantability. In this example, the assumption is that all the cars work, but the lemons simply have more problems, yet not so much that it leads to a legal obligation on the part of the seller. A better example might be a meal at a restaurant or a wine that can vary greatly in perceived quality, but this does not lead to legal liability.

time invariant characteristics, the fundamental market imperfect is a lack of information that does not allow buyers to distinguish between commodities with different characteristics. A prediction of this class of models is that improving information has the potential of ensuring better pricing of commodities, and hence more efficient exchange. There are growing body of work supporting this claim.

In an important study, Jin and Leslie (2003) finds that consumers vary their demand for a restaurant as a function of posted health report cards. What makes the study particularly convincing is that the inspection protocol in Los Angeles for restaurants did not change. All that happened is that after the law change, consumers were "treated" with a health report card on the window of the restaurant (I lived in LA at the time, and certainly stopped going to the "C" restaurants in the area). Similar work has been done for groceries (Ackerberg (2003)), health care (Geweke et al. (2003); Chernew et al. (2008)), eBay (Cabral and Hortaçsu (2010)) and wine (Macchiavello (2010)).

This work illustrates that the demand for a good depends upon the information parties have regarding the characteristics of a good. This turns out to be one feature of observed business norms. For example, Bernstein (1992) discusses one of the important skills that traders have is the ability to evaluate the quality of the stones they trade (page 118). In the case of the cotton industry, section 2 of Bernstein (1996) discusses the many bright line rules that use industry specific terms such as "prompt", "raingrown", and "long staple".[28] What is interesting is that these terms are used to clarify the characteristics of the cotton that is being delivered, including time and quality, and hence deal with the adverse selection problem of Akerlof rather than contract enforcement per se. This illustrates the important role that the concept of a commodity plays in exchange. If a commodity is more precisely defined, then this can act as a substitute for a good reputation. This is one of the goals of the International Standards Organization (ISO), which has no powers of enforcement, but provides a set of measurable standards that help define commodities and assist in economics development (see `www.iso.org`).

[28] Page 1732.

In summary, in markets that rely upon trade prices, reputation for quality is important. However, extra-legal institutions that clarify the definition of a commodity can act as a substitute for reputation and help solve the adverse selection problem identified by Akerlof (1970). Before turning to the issue of contract price, let us briefly consider what happens when reputation effects interact with behavior.

Jin and Leslie (2003, 2009) find that restaurants as well as customers respond to the reputation signal given by health report cards. In particular, the introduction of the ratings system led to a drop in death by food poisoning in Los Angeles. In the context of physicians, Wang et al. (2011) find that low quality health providers do respond to poor grades on their health report cards. These results would seem to support Friedman (1962)'s claim that reputation effects are sufficient to police the quality of goods in markets, an argument that was formalized by Fama (1980).

In an important paper, Holmstrom (1999) explored carefully the interaction between effort and reputations. He made the following remarkable observation. When reputation represents beliefs regarding the quality of a good, then necessarily they include both the point estimate of quality and how *sure* one is regarding this estimate. If there is very little experience with a supplier, then one's beliefs adjust quickly. Holmstrom observed that this gives strong incentives for the seller to increase quality and manipulate the beliefs of the buyer, which can lead to inefficiently *high* effort when a firm or individual is building their reputation.

However, once a seller becomes well known, then she has little incentive to manipulate her reputation, which in turn leads to low effort. Gibbons and Murphy (1992) directly test this model with data on CEO compensation. They exploit the fact that the age of a CEO determines how many years remain in their career and find that compensation contracts rely upon reputation when a CEO is young and unproven. However, for the older CEO, the compensation contract switches to more performance pay, consistent with a decline in the importance of reputation effects. MacLeod and Urquiola (2013) integrates school reputation into model of school competition. They show that this can explain that students work very hard to

gain admission to elite schools, yet once accepted, they have much lower incentives to work, because they are assured of a good job upon graduation.

Kreps et al. (1982) apply the reputation model to the prisoner's dilemma game. They extend the model by assuming that players vary in their preferences, but this is unknown to the other players. Specifically they introduce the assumption that there is a chance that some individuals use a tit for tat (TFT) strategy.[29] They then show that there is a unique equilibrium in which rational players mimic the TFT strategy to fool the other player to cooperate. A feature of the equilibrium is that cooperation will break down near the end of the game. Moreover, once an individual deviates from TFT, then for all future plays cooperation is impossible.

These reputation models are technically very beautiful, and have been widely studied by economists. Tadelis (1999) shows that this model can be used to understand the market for reputations. Morrison and Wilhelm (2004) apply it to explore professional codes of behavior. Mailath and Samuelson (2006) provides a comprehensive review of many other applications. Overall, while preferred by economic theorists, this class of models has not been widely used to guide and organize the empirical evidence. One reason is that the predictions are very sensitive to the beliefs of agents, an unobserved input to these models. However, economic data are very noisy and it is not all clear how to make the step from these elegant models to the "swamp" of economic data sets. Some progress is being made for experimental games where it is assumed that agents cannot perfectly choose their strategies (Rogers et al. (2009)).

5 Contract Price

A typical sales contract entails a seller agreeing to supply a commodity at a future date for a well defined trade price. Contract breach occurs when one or both parties fail to perform as promised. When breach occurs, the

[29] Tit-for-tat in a prisoner's dilemma game is one where the play simply copies the play of the other player the previous period - cooperate if the other did, cheat if the other did. This strategy is in general *not* an equilibrium to the game, but Axelrod (1984) found that it worked very well against a population of strategies submitted by individuals.

harmed party has the right to take the dispute to a court of law. There, as Judge Oliver Wendell Holmes (1897)observes: "The duty to keep a contract at common law means a prediction that you must pay damages if you do not keep it,—and nothing else."[30].

Thus if the seller chooses a quantity or quality different from the agreement, then the payment she receives will be reduced.[31] Notice that a key feature of such a contract is that the payment to the buyer is state contingent - it varies with the level of performance. The use of such contingent pricing is one of the solutions that Akerlof (1970) observes which can solve the adverse selection problems. This corresponds to warranties for cars in the market for lemons. Another example is documented in Banerjee and Duflo (2000) who observe that suppliers of software services mitigate low quality by providing after the sale services and support - this is the remedy of "cure" that is allowed under UCC 2-508.

By *contract price,* I mean any arrangements in which terms vary after delivery, and for which there is an associated notion of *breach.* This is very distinct from the notion of trade price discussed above where dissatisfied customers must fend for themselves. The notion of a contract price is best discussed in the context of a simple example. Such examples may lack the richness of a case study, however. the goal is to show that *small* variations in the environment can lead to *significant* variations in predicted contract form.

5.1 The One Period Contract

Consider the case of a once off exchange with a contract between two agents A and B. We keep the payoffs fixed, but by varying the context and information structure to illustrate the impact this has upon the predicted contract form. In some cases A might be a seller, in others a buyer. The stages are as follows:

[30]Page 462.

[31]The common law rule for contract breach is the awarding of "expectation damages" - an amount that ensures the promisee receives the value agreed to by the promisor.

1. A and B meet and agree upon a contract. If no agreement is reached both parties get zero.

2. Individual A chooses effort $\pi \in \{\pi_b, \pi_g\}$, where $1 > \pi_g > \pi_b > 0$ that represents the probability that there is a good outcome g. In general this effort is not observable, though it might be with sufficient cost. The currency is normalized so that the cost of effort π is π.

3. The state $s \in \{g, b\}$ is realized. If g occurs the value of trade is $v_g = \beta > 1$, if the bad outcome b occurs then trade has no value, $v_b = 0$. The value of trade is assumed to be easily observable by both agents.

4. Parties choose to trade or not as function of the state s, denoted by $q_s \in \{0, 1\}$, and transfers occur under the terms of the contract. The cost of production is c and it is assumed to satisfy $\beta - 1 > c > 0$.

In this model, the only substantive decisions are the level of effort, π, and the trade decision as a function of the state, $\{q_g, q_b\}$. Working backwards we can determine the efficient allocation for this model. If there a bad outcome, since the cost of production is $c > 0$ then no trade is optimal, and hence $q_b^* = 0$. If the outcome is g, then since $\beta > c$, trade is optimal and hence $q_g^* = 1$. Given this the expected value from choosing effort π is

$$W(\pi) = \pi(\beta - c) - \pi = \pi(\beta - (1 + c)) > 0.$$

The net return from effort is positive, and hence gains from trade are maximized effort is high (π_g), and trade occurs if and only if the state is high (g). The next issue is how can parties design contract prices in the shadow of the law that achieves this outcome?

Buyer Liability

Consider a very stylized version of Bernstein (1992)'s diamond market example. Suppose A is a buyer of diamonds and B is a seller. A feature of this market is that the buyer is often liquidity constrained and hence prefers to

pay the seller after he has had an opportunity to cut and sell the diamonds. In that case, the contract would stipulate that the buyer inspect (with effort $\pi \in \{\pi_g, \pi_b\}$), and take delivery. He would be required to pay after a reasonable period, say 60 days. Given that the buyer inspects the goods, the contract assigns all liability regarding the quality of the good with the buyer.

Here we can suppose that β is the value of good, and c is the cost of cutting the diamond. For simplicity, we can suppose that if the buyer makes an error in judgment, then he may later learn that the diamond has no value and should be sold for some other use. Under these assumptions the diamond is sold to the buyer with no warranty at price p, and the buyer has sixty days to pay.

In the absence of a warranty, the payoff for the buyer is:

$$U - buyer(\pi) = \pi(\beta - c - 1) - p.$$

In this case contract *breach* would simply be non-payment of p. Under the standard expectation damages rule for contract, damages would be p. Since $(\beta - c - 1) > 0$ then it immediately follows that it is optimal for the buyer to choose high effort (π_g). Thus, when the buyer is in the best position to evaluate the quality of the good, it is optimal to have a fixed price contract under which the buyer accepts all liability for defects. In this case the role of the law (or diamond merchant association) is to ensure that payment by the buyer occurs.

Moral Hazard

Next, we consider a very stylized version of Bernstein (2001)'s cotton industry. Suppose that the seller is a cotton farmer whose unobserved effort, π, determines whether the cotton has high quality, with benefit β, or low quality with no value. Suppose the farmer agrees to sell a certain quality of cotton to a firm in the future at a price p, and that the cost of delivery is c. If the contract simply states that the farmer delivers cotton, then her

benefit is given by:

$$U - seller = p - c - \pi.$$

Under this contract the seller would choose π_b.

Bernstein (2001) observes that one of the roles of a trade association is to help provide quality standards. If upon receiving the cotton, the firm finds that the cotton does not meet industry standards for quality, then under the expectations damage rule, the court would order the seller to pay β to the buyer in the event of breach. In that case the payoff would be:

$$U - seller = p - c - \pi - \beta(1 - \pi),$$

and the seller will always choose the high effort π_g.

This solution is *not* efficient because it always entails delivery. The optimal solution would have no trade if the good is substandard. Rogerson (1984) shows that if one allows for renegotiation before trade occurs, then we get efficient trade *ex post.* This may or may not give rise to efficient effort incentives. When the bad state occurs, the gain from renegotiation is to save upon the production costs c. The seller is obliged in this case to pay to the buyer β under expectation damages, and thus with renegotiation, the payoff is:

$$\begin{aligned} U - seller &= p - c - \pi - (\beta + c/2)(1 - \pi), \\ &= p - \beta + c/2 + \pi(\beta - 3c/2 - 1). \end{aligned}$$

If $(\beta - 3c/2 - 1) > 0$ then the seller chooses high effort and first best is achieved.

Relationship Specific Investments

Consider now the case of *relationship specific investments,* or what legal scholars have called the *reliance interest* (Fuller and Perdue (1936)).[32] These

[32]In economics, Mincer (1962) discusses the implications of investments that are job specific and have no value on the market. Klein et al. (1978) discuss the implications of relationship specific investments for vertical integration.

are post contract investments that increase the gains from trade but have no value outside the relationship. For example, suppose Agent A is the seller, and the investment is into cost reduction that allows her to offer a specialized good to the buyer at a lower price. In this case the effort π is the probability that production costs are low. Let $c_b > c_g > 0$ be high and low production costs respectively. Let V be the value of the good to the buyer, and zero to anybody else. First suppose that it is efficient to trade *ex post* if and only if costs are low since $c_b > V > c_g$. We can map this case into our base example by setting $\beta = c_b - c_g$ and $c = c_b - V$. Suppose that the seller pays the costs and the buyer gets V. Thus when there is trade the net value is $\beta - c$ when β is realized, and $-c$ otherwise.

If trade is always efficient, then under a fixed price contract, seller would like to minimize costs, which in turn leads to efficient investment. This may no longer be the case when trade is not always efficient because renegotiation may lead to a sharing of the rents from investment with the buyer (see Hart and Moore (1988) for a general analysis of this case). Nöldeke and Schmidt (1998) and Edlin and Hermalin (2000) show that efficiency can be achieved with an *option contract.*

The structure of the contract is as follows. The buyer B offers the seller A the *option* to sell at price p, with no penalty if the seller decides not to sell. Suppose the price is set to satisfy:

$$c_b > V > p > c_b + 1,$$

then the buyer will always be happy to buy at price p. On the seller's side, she will supply the good if and only if she has low costs, and thus her payoff is given by:

$$U - seller = \pi \left(p - c_b - 1 \right).$$

Since the term in brackets is positive, then she will set $\pi = \pi_g$, and we get efficient investment combined with efficient trade.

In each of these cases, the final efficient allocation is identical. However, the contract price used to implement the efficient allocation varies a great deal. In the first case, enforcement was purely financial - it was up to the

buyer to inspect the good and determine quality. In the second case with moral hazard, the seller's effort determined the quality of the good - there is a fixed price combined contract renegotiation which played a crucial role in achieving the efficient outcome. Finally, we considered a case where the seller's effort determines the cost of production. In that case, efficiency is achieved with a fixed price contract that gives the seller the option to sell.

The point here is that one does not need a complex environment to generate a great deal of heterogeneity in contract form - it follows naturally from variations in information structure. Of particular importance is the allocation of decision rights. In the first case, the buyer has the right not to purchase after inspection of the goods. In the second case, parties jointly renegotiate as a function of the observed quality of the good. In the final case, the seller has the right to sell or not. Thus, a distinguishing feature of contract price relative to a trade price is the allocation of decision rights. Chakravarty and MacLeod (2009) show that a key feature that forms construction contracts produced by the American Institute of Architects that are used for the management of large and complex construction projects is the careful allocation of decision rights, all of which is done within the shadow of the law.

5.2 Relational Contracts

The purpose of this section is to review the rather narrow literature on relational contract theory in economics. The previous section has illustrated a number of examples of contract prices that implement efficient allocations under the appropriate conditions. It was assumed that contract law, and the rule of expectation damages, could be applied at low cost. There are many situations where parties are able to productively trade even though the law either does not work well or is prohibitively expensive to use.

Greif (1989) shows that social groups in medieval times play a crucial role in contract enforcement, while Greif et al. (1994)'s work on the law merchant provides historical examples of exchange that is enforced in the absence of formal law. More recent work includes McMillan and Woodruff (1999) who

point out the important of informal contracts in Vietnam, while Johnson et al. (2002) highlight the complementarities between informal enforcement and courts.

In contrast with legal scholarship we discussed above, the theory on relational contract abstracts from the issues associated with economic and trade price to focus upon the conditions under which contract prices can be informally enforced. This work builds upon the research that applies the prisoner's dilemma game to social interactions. Beginning with the work of Axelrod (1981, 1984), there is a literature that suppose life can be viewed as a repeated game between two individuals who much choose each period between trusting each other or cheating/opportunism. The basic idea is that trust is sustainable if parties are in a social environment where others can observe their behavior. This simple idea has been very fruitful and widely applied to a variety of questions, such as Kranton (1996)'s work on sustaining reciprocal trade relationships, and more recently Dixit (2003)'s work on explaining the rise of private governance relationships.

Relational contract theory adds, not surprisingly, contract prices to this model. The first model is due to Telser (1980), though the literature has tended to follow the model introduced in MacLeod and Malcomson (1989). Macleod and Malcomson consider a situation in which parties meet repeatedly over time, but can terminate the relationship at any point. Here I consider a simplified version of the model that is sufficient to make most of the important points. The key ingredient to the model is the assumption that every period there is a future surplus V^* that is larger than what they would get if they did not trade. In the event of a breakdown in the relationship, it is assumed that the firm gets U_F^0 and the worker gets U_W^0. The threat of breakdown of the relationship is a substitute to seeking relief in court. As MacLeod (2007) discusses, this strategy is preferred when the cost of using the courts system is high relative to the gains from trade.

A relational contract is an agreement between the worker and the firm in which there is legally enforceable payment w to the worker. The worker agrees to select effort π_g. In exchange, the firm agrees to pay a bonus b if the worker chooses π_g. If the worker does not choose the high effort, then

the firm will view the worker in breach of their agreement and will terminate the relationship.

Similarly, if the firm does not pay the bonus, then the worker will view the firm in breach of contract, and terminate the relationship. What makes the contract relational is that rather than ask the court for relief, the parties threaten to leave the relationship - this may be their only option if effort is not observable outside the relationship. If termination occurs, then the surplus, $S*$, from future trade is destroyed:

$$S^* = V^* - \left(U_F^0 + U_W^0\right) > 0.$$

If neither party breaches the agreement, then they continue to trade. As part of their agreement, the worker gets a share $\alpha \in [0, 1]$ of the surplus. In practice the allocation of the future share can be achieved via a set of trade prices. However, we adopt this formulation in order to focus upon the important role that the allocation of future rents plays in relational contract theory.

Consider first the firm. If no party breaches the agreement, the firm has payoff:

$$U_F^* = \pi_g \beta - w - b + (1 - \alpha) V^* = CurrentProfit + FutureProfit \quad (5.1)$$

After the worker has chosen effort, the firm might be tempted to cheat upon the agreement and not pay the bonus. Thus a necessary condition for this contract to be self-enforcing is:

$$U_F^* \quad \geq \pi_g \beta - p + U_F^0 = DefectProfit + OutsideOptionProfit. \quad (5.2)$$

Notice that this implies that following incentive constraint for the firm:

$$FurtureProfit - OutsideOptionProfit \geq Bonus \quad (5.3)$$

A similar situation for the worker holds:

$$U_W^* = w + b - \pi_g + \alpha V^*.$$

If the worker shirks, then the firm will not pay the bonus and fires the worker. Thus, for the relational contract to be self-enforcing we have:

$$U_W^* = p + b - \pi_g + \alpha V^* \geq p - \pi_b + U_W^0.$$

This implies the following incentive constraint:

$$FutureUtility - OutsideOptionWorker \geq IncentiveToCheat - Bonus. \tag{5.4}$$

These expressions illustrate that there is a connection between the division of the rents and contract form. If the firm has a greater share of the surplus, then it can credibly commit to a larger bonus, which in turn reduces the rent that it must leave to the worker to provide incentives.

Consider the two polar cases. Suppose that the market for the firm is perfectly competitive - by this we mean that the future rent for the firm is equal to its outside option. Thus equation (5.3) implies that $0 \geq bonus$, or there is no bonus pay. This implies that in equation (5.4) we have:

$$FutureUtility - OutsideOptionWorker \geq IncentiveToCheat > 0.$$

In other words, the worker must receive a rent or she will shirk. This case corresponds to the well known efficiency wage model of Shapiro and Stiglitz (1984) where workers are paid a high wage, and then fired if they are caught shirking. The rent needed to enforce the contract is generated by equilibrium unemployment. Klein and Leffler (1981) have a similar model, though in their case they argue that firms with good reputation dissipate rents with wasteful advertising.

As an empirical fact, many workers are not paid on fixed wages, as assumed in these models. MacLeod and Parent (1999) show that bonus pay is very common in the US, while Lemieux et al. (2009) document a significant increase in the use of bonus pay since 1980. In some jobs, such as sales, more that 50% of workers receive some form of explicit bonus pay. In MacLeod and Malcomson (1998), we show that one can link the form of incentive pay to the relative cost of capital and a set of labor market norms. MacLeod and Parent (2014) present some preliminary evidence on how observed contract form can be explained by this theory.

A robust prediction of the theory is that efficiency of the relationship is related to the size of the rent and does *not* depend upon contract form. If we add constraints 5.3 and 5.4 we get that the future value of a relationship must be greater than the sum of the outside options by at least the size of the temptation to cheat:

$$GainsFromTrade - OutsideOptions \geq IncentiveToCheat\,(\pi_g - \pi_b)\,.$$

MacLeod and Malcomson (1989) show that this condition is not only necessary, but sufficient for the existence of self-enforcing relational contracts. That is, if it is satisfied, then there exist relational contracts that implement the efficient allocation. The form of the contract (the size of the bonus) is a function of how the surplus from the relationship is divided between the two parties.

There is quite a bit of evidence supporting that parties in long term relationship can achieve more efficient outcomes than no trade despite the lack of legal enforcement. There is a voluminous literature, beginning with the work Flood (1952). List and Rasul (2011) and Charness and Kuhn (2011) show that individuals in long term relationships cooperate early in the relationship, but may defect towards the end of the game. Brown et al. (2004) explore an experimental labor market with *endogenous* long term relationships. In their model, the bonus pay feature is turned off, and they find that successful long term relationships rely upon rent sharing to elicit cooperation from workers.

In an interesting paper, Macchiavello and Morjaria (2014) have a credible identification strategy that allows one to see the causal effect (in the Rubin/Holland sense) of value V^* upon trade. They use the rise of violence in Kenya as an exogenous shock to the value of the relationship in the market for cut flowers. Since violence is not controlled by the firm, then supply delays would be necessarily be viewed by foreign buyers as a contract breach. Macchiavello and Morjaria (2014) find that the future value of trade does affect the level of trade, as in MacLeod and Malcomson (1989). He also finds that there is a U-shaped effect that is consistent with the learning model of Holmstrom (1999) - younger firms work harder to supply their foreign buyers than the long lived firms.

There are also several papers that document the importance of bonus pay. Shearer (2004) has a very nice experimental paper demonstrating the impact that bonus pay has upon productivity. Dohmen and Falk (2011) provide some further evidence on the interaction between bonus pay and gender. Falk et al. (2015) extend the Brown et al. (2004) model to allow for bonus pay and job security. Job security in effect forces individuals into a relational contract. They find that the addition of bonus pay dramatically improves the effectiveness of the relational contract.

MacLeod (2007), relying upon earlier work by Schmidt and Schnitzer (1995), shows that self-help solutions apply only when the value of the relationship is not too high. Schmidt and Schnitzer (1995) show that in high value relationships, relational contracting may not work because parties would renegotiate with legally enforceable contracts. Baker et al. (1994) suppose that parties can use a mix of formal and informal performance contracts. They show that in some case formal contract can enhance performance, and predict that such a case is consistent with the empirical evidence reported by Gibbons and Murphy (1992).

Bernheim and Whinston (1998) extend the model in MacLeod and Malcomson (1989) to allow for endogenously incomplete contracts. They show that adding some ambiguity to a contract can increase the future value relative to no trade, and thereby increase the set of situations where relational contracts can be used. Scott (2003) examines a last set of legal cases in the

US, and finds some evidence that parties follow this strategy.

5.3 Current Trends

The theory of relational contracts is advancing quickly, far outpacing the empirical evidence. Most significant are the papers that allow for more general information structures, particularly Levin (2003), Fuchs (2007), and Halac (2012). Levin (2002),Rayo (2007) and Doornik (2006) study the use of relational contracts in teams, while Li and Matouschek (2013) look at the effect of conflicts. One of the more interesting developments is models that explore learning in the context of a relationship, particularly Chassang (2010) and Gibbons and Henderson (2012). The next frontier will be sorting out the empirical implications of these very sophisticated papers.

6 Summary

The goal of this essay is to help bridge the gap between the notion of a relational contract as used in the law and society scholarship, and the more narrow concept in the economics literature. What I learned from this exercise is that "relational contracts" in the Macaulay/Macneil tradition is a very broad concept that can benefit from all areas of modern micro-economics. The main points of the review can be summarized as follows.

First, it is very common for scholars to make causal claims, such as matters would be improved only if the courts would follow a particular rule. Such causal claims *necessarily* entail using a model of the world. One of the reasons why formal models are used is to provide a systematic way to build and test such models. It is also worth keeping in mind that models are necessarily false - they are decision tools that provide simplified versions of the world around us that hopefully can help produce better decisions.

Second, normative statements regarding the allocation of resources entail using a well defined notion of a good. Though the "commodification" of economic life cannot be guaranteed to improve matters, it is striking, as the work of Lisa Bernstein documents, that the definition of commodities and

what constitute performance are important activities for trade associations.

Third, closely associated with the definition of a commodity is the notion of an "economic price". At an efficient allocation of resources, the economic price of a commodity reflects the resource cost of producing that good or service. The economic price is distinct from the "trade price", the actual price at which the commodity is exchanged.

The fourth point is that this distinction is important for a number of reasons. First, it can help one spot what Paul Krugman (2014) has called a "bait and switch" move by economists. While economic prices are associated with the efficient allocation of resources, this is not the case with the trade price that can correspond to a bundle of different commodities (as Akerlof (1970) observed). Hence, there can be no presumption that "free markets" in the sense of Friedman (1962) lead to an efficient allocation. This year's Nobel prize in economics (2014) was awarded to Jean Tirole, who, along with Jean-Jacques Laffont (Laffont and Tirole (1993)), developed a theory of regulation that follows directly from Akerlof (1970)'s work. Their goal is to address the inefficiencies that may arise from the use of trade prices that do not reflect the economic price of a commodity.

More generally, if markets were complete, and hence trade prices reflect the economic price of commodities, then the only significant policy issue is the question of inequality. Markets are far from complete, and hence there are typically economic rents associated with trade prices, particularly when they can be manipulated by powerful actors in the market. The fifth point of the essay is to observe that a solution to this in the context of bilateral exchange is to use a "contract price". In section 5.1 we discussed the design of efficient contract prices when parties have access to inexpensive adjudication. An important feature of these contractual solutions is the explicit allocation of decision rights - in other words, the allocation of power has allocative implications, a theme that goes back to the work of Simon (1951).

The issues of power, status, and social capital are central concerns in the sociology literature (see for example Coleman (1994) and Burt (2007)). This analysis here suggests that these issues are intimately associated with the fact that markets are very incomplete. The consequence is, as Macaulay (2000)

observes, a "swamp" of variegated economic actors. There are enormous opportunities for productive exchange between these intellectual traditions. Highlighting the distinction between different notions of prices will hopefully provide some context for scholars in the law and society tradition to allow their work to better connect with work in economics.

The final section of the paper deals with some of the frontier work in economics on relational contracts. The main lesson from this research that is relevant to the law and society literature is that reputation is not only endogenous, but closely connected to contract form. When a firm or individual has a good reputation, then it is not necessary for their counter party to have a good reputation. Performance issues can be handled via a relational contract in which the reputable party provides the required incentives.

An important open question is how we explain the institutions we observe. A feature of relational contracts is that there are many possible stable solutions, not all of which are efficient. We need better tools to identify dysfunctional relationships, why they are stable, and how we can intervene to help make them better. This is an enormous, but important task, which will require all disciplines to work together and pull in the same direction.

References

Abreu, D. (1988). On the theory of infinitely repeated games with discounting. *Econometrica 56*(2), 383–396.

Ackerberg, D. A. (2003). Advertising, learning, and consumer choice in experience good markets: An empirical examination. *International Economic Review 44*(3), 1007–1040.

Akerlof, G. A. (1970). The market for 'lemons': Quality uncertainty and the market mechanism. *Quarterly Journal of Economics 84*(3), 488–500.

Angrist, J. and J.-S. Pischke (2009). *Mainly Harmless Econometrics*. Princeton, NJ: Princeton University Press.

Autor, D. H., J. J. Donohue, and S. J. Schwab (2004, May). The employment consequences of wrongful-discharge laws: Large, small, or none at all? *American Economic Review 94*(2), 440–446.

Axelrod, R. (1981, June). The emergence of cooperation amoung egoists. *American Journal of Political Science 75*(2), 306–318.

Axelrod, R. (1984). *The Evolution of Cooperation*. New York: Basic Books.

Baker, G., R. Gibbons, and K. J. Murphy (1994, November). Subjective performance measures in optimal incentive contracts. *The Quarterly Journal of Economics 109*(439), 1125–1156.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology 52*, 1–26.

Banerjee, A. V. and E. Duflo (2000). Reputation effects and the limits of contracting: A study of the indian software industry. *Quarterly Journal of Economics 115*(3), 989–1017.

Becker, G. (1976). *The economic approach to human behavior*. Chicago, Il.: University of Chicago Press.

Bergemann, D., B. Brooks, and S. Morris (2014, April). The limits of price discrimination. Technical Report Discussion Paper No. 1896RR, Cowles Foundation.

Bernheim, B. D. and M. D. Whinston (1998, September). Incomplete contracts and strategic ambiguity. *American Economics Review 68*(4), 902–32.

Bernstein, L. (1992). Opting out of the legal system: Extralegal contractual relations in the diamond industry. *The Journal of Legal Studies 21*(1), pp. 115–157.

Bernstein, L. (1996). Merchant law in a merchant court: Rethinking the code's search for immanent business norms. *University of Pennsylvannia Law Review 144*, 1765–1821.

Bernstein, L. (2001, July). Private commercial law in the cotton industry: Creating cooperation through rules, norms, and institutions. *Michigan Law Review 99*, 1724–1790.

Bernstein, L. (2014a). Merchant law in a modern economy. In G. Klass, G. Letsas, and P. Saprai (Eds.), *Philosophical Foundations of Contract Law*. Oxford Univ Press.

Bernstein, L. (2014b, August). Private ordering, social capital, and network governance in procurement contracts: A preliminary exploration. Technical report, Chicago Law School. mimeo.

Bertrand, M., E. Duflo, and S. Mullainathan (2004, Feb). How much should we trust differences-in-differences estimates? *Quarterly Journal of Economics 119*(1), 249–275.

Brown, M., A. Falk, and E. Fehr (2004, May). Relational contracts and the nature of market interactions. *Econometrica 72*(3), 747–780.

Bull, C. (1987). The existence of self-enforcing implicit contracts. *Quarterly Journal of Economics 102*, 147–159.

Burt, R. S. (2007). *Brokerage and Clusure*. Oxford University Press.

Cabral, L. and A. Hortaçsu (2010). The dynamics of seller reputation: Evidence from ebay. *The Journal of Industrial Economics 58*(1), 54–78.

Camerer, C. F., G. Loewenstein, and M. Rabin (Eds.) (2003). *Advances in Behavioral Economics*. Princeton, NJ: Princeton University Press.

Chakravarty, S. and W. B. MacLeod (2009, FAL). Contracting in the shadow of the law. *Rand Journal of Economics 40*(3), 533–557.

Charness, G. and P. Kuhn (2011). Lab labor: What can labor economists learn from the lab? In O. Ashenfelter and D. Card (Eds.), *Handbook of Labor Economics, Volume 4*, Volume 4. Elsevier.

Chassang, S. (2010, March). Building routines: Learning, cooperation, and the dynamics of incomplete relational contracts. *American Economic Review 100*(1), 448–65.

Chernew, M., G. Gowrisankaran, and D. P. Scanlon (2008). Learning and the value of information: Evidence from health plan report cards. *Journal of Econometrics 144*(1), 156–174. ISI Document Delivery No.: 314XM Times Cited: 17 Cited Reference Count: 32 Chernew, Michael Gowrisankaran, Gautain Scanlon, Dennis P. 17 Elsevier science sa Lausanne Economics; Mathematics, Interdisciplinary Applications; Social Sciences, Mathematical Methods.

Coleman, J. S. (1994). *Foundations of Social Theory*. Cambridge Mass., U.S.A.: Harvard University Press.

Craswell, R. (1993). The relational move: Some questions from law and economics. *Southern California Interdisciplinary Law Journal 3*, 91.

Currie, J. and W. B. MacLeod (2008, May). First do no harm? tort reform and birth outcomes. *Quarterly Journal of Economics 123*(2), 795–830.

Debreu, G. (1959). *Theory of Value*. New Haven, CT: Yale University Press.

Dixit, A. (2003, Mar). On modes of economic governance. *Econometrica 71*(2), 449–481.

Dohmen, T. and A. Falk (2011, APR). Performance pay and multidimensional sorting: Productivity, preferences, and gender. *American Economic Review 101*(2), 556–590.

Donohue, John J., I. and S. D. Levitt (2001, May). The impact of legalized abortion on crime. *Quarterly Journal of Economics 116*(2), 379–420.

Doornik, K. (2006). Relational contracting in partnerships. *Journal of Economics & Management Strategy 15*(2), 517–548.

Edlin, A. S. and B. E. Hermalin (2000, October). Contract renegotiation and options in agency problems. *Journal of Law, Economics, and Organization 16*(2), 395–423.

Falk, A., D. Huffman, and W. B. MacLeod (2015). Institutions and contract enforcement. *Journal of Labor Economics 33*(3).

Fama, E. F. (1980, April). Agency problems and the theory of the firm. *Journal of Political Economy 88*, 288–307.

Farnsworth, E. A. (2004). *Contracts, 4th edition*. New York: Aspen Publishers.

Ferguson, N. (Ed.) (2008). *Virtual History: Alternatives and Counterfactuals*. New York, NY: Basic Books.

Flood, M. M. (1952). Some experimental games. Research Memorandum RM-789, The RAND Corporation, Santa Monica, CA.

Friedman, M. (1962). *Capitalism and Freedom*. Chicago: University of Chicago Press. With the assistance of Rose D. Friedman. 23 cm.

Fuchs, W. (2007). Contracting with repeated moral hazard and private evaluations. *The American Economic Review 97*(4), pp. 1432–1448.

Fuller, L. L. and W. Perdue (1936, nov). The reliance interest in contract damages: 1. *The Yale Law Journal 46*(1), 52–96.

Geweke, J., G. Gowrisankaran, and R. J. Town (2003). Bayesian inference for hospital quality in a selection model. *Econometrica 71*(4), 1215–1238.

Gibbons, R. and R. Henderson (2012). Relational contracts and organizational capabilities. *Organization Science 23*(5), 1350–1364.

Gibbons, R. and K. J. Murphy (1992). Optimal incentive contracts in the presence of career concerns. *Journal of Political Economy 100*, 30–52.

Greenspan, A. (1998, July 24). The regulation of otc derivatives. Testimony of Chairman Alan Greenspan, Federal Reserve Board.

Greenspan, A. (2008, October 23). Remarks to house committee of government oversight and reform. Wall Street Journal.

Greif, A. (1989, Dec). Reputation and coalitions in medieval trade - evidence on the Maghribi traders. *Journal of Economic History 49*(4), 857–882. Times Cited: 79.

Greif, A., P. Milgrom, and B. R. Weingast (1994). Coordination, commitment, and enforcement: The case of the merchant guild. *Journal of Political Economy 102*(4), pp. 745–776.

Hadfield, G. K. (1990, Apr). Problematic relations - franchisingthe law of incomplete contracts. *Stanford Law Review 42*(4), 927–992.

Halac, M. (2012). Relational contracts and the value of relationships. *American Economics Review 102*(2), 750–779.

Hart, O. (1975, December). On the optimality of equilibrium when the market structure is incomplete. *Journal of Economic Theory 11*(3), 418–43.

Hart, O. D. and J. Moore (1988, July). Incomplete contracts and renegotiation. *Econometrica, 56*(4), 755–785.

Hermalin, B. E., A. W. Katz, and R. Craswell (2006). Law and economics of contracts. In A. M. Polinsky and S. Shavell (Eds.), *Handbook of Law and Economics*. Amsterdam: North-Holland.

Holland, P. W. (1986). Statistics and causal inference. *Journal of the American Statistical Association 81*(396), 945–960.

Holmes, O. W. (1897, Mar. 25). The path of the law. *Harvard Law Review 10*(8), 457–478.

Holmstrom, B. (1999, January). Managerial incentive problems: A dynamic perspective. *Review of Economic Studies 66*(1), 169–182.

Imbens, G. W. and D. B. Rubin (2011). *Causal Inference in Statistics and Social Sciences*. Oxford University Press.

Jin, G. Z. and P. Leslie (2003, May). The effect of information on product quality: Evidence from restaurant hygiene grade cards. *Quarterly Journal of Economics 118*(2), 409–51.

Jin, G. Z. and P. Leslie (2009). Reputational incentives for restaurant hygiene. *American Economic Journal-Microeconomics 1*(1), 237–267. ISI Document Delivery No.: 683WC Times Cited: 21 Cited Reference Count: 29 Jin, Ginger Zhe Leslie, Phillip 21 Amer economic assoc Nashville Economics.

Johnson, S., J. McMillan, and C. Woodruff (2002, April). Courts and relational contracts. *Journal of Law, Economics, and Organization 18*(1), 221–77.

Kahneman, D. and A. Tversky (1979). Prospect theory: An analysis of decisions under risk. *Econometrica 47*, 262–91.

Kessler, D. and M. McClellan (1996). Do doctors practice defensive medicine? *Quarterly Journal of Economics 111*(2), 353–90.

Klein, B., R. Crawford, and A. Alchian (1978, October). Vertical integration, appropriable rents, and the competitive contracting process. *Journal of Law and Economics 21*, 297–326.

Klein, B. and K. Leffler (1981). The role of market forces in assuring contractual performance. *Journal of Political Economy 89*, 615–641.

Kornai, J. (1971). *Anti-Equilibrium*. Amsterdam, The Netherlands: North-Holland Publishing Co.

Kranton, R. (1996, September). Reciprocal exchange: A Self-Sustaining system. *American Economic Review 86*(4), 830–51.

Kreps, D. M., P. Milgrom, J. Roberts, and R. Wilson (1982). Rational cooperation in the finitely repeated prisoners-dilemma. *Journal of Economic Theory 27*(2), 245–252. Article.

Kreps, D. M. and R. Wilson (1982, August). Reputation and imperfect information. *Journal of Economic Theory 27*(2), 253–79.

Krueger, A. B. (1991, July). The evolution of unjust-dismissal legislation in the united states. *Industrial and Labor Relations Review 44*(4), 644–60.

Krugman, P. (2014, September 25). The dismal science 'seven bad ideas,' by jeff madrick. *The New York Time*. Sunday Book Review.

Laffont, J.-J. and J. Tirole (1993). *A Theory of Incentives in Procurement and Regulation*. Cambridge, MA, U.S.A.: MIT Press.

Lemieux, T., W. B. MacLeod, and D. Parent (2009, February). Performance pay and wage inequality. *Quarterly Journal of Economics 124*(1), 1–49.

Levin, J. (2002, August). Multilateral contracting and the employment relationship. *Quarterly Journal of Economics 117*(3), 1075–1103. TY - JOUR Accession Number: 0620224 . Publication Type: Journal Article. Update Code: 200210.

Levin, J. (2003). Relational incentive contacts. *American Economic Review 93*(3), 835–857.

Li, J. and N. Matouschek (2013, OCT). Managing conflicts in relational contracts. *American Economic Review 103*(6), 2328–2351.

List, J. A. and I. Rasul (2011). Field experiments in labor economics. *Handbook of Labor Economics 4*, 103–228.

Llewellyn, K. N. (1930). A realistic jurisprudence - the next step. *Columbia Law Review 30*(4), 431–465. Llewellyn, Karl N.

Macaulay, S. (1963). Non-contractual relations in business: A preliminary study. *American Sociological Review 28*(1), 55–67.

Macaulay, S. (2000, Spring). Relational contracts floating on a sea of custom? thoughts about the ideas of ian macneil and lisa bernstein. *Northwestern*

University Law Review 94(3), 775–804. Copyright - Copyright Northwestern University School of Law Spring 2000; People - Macneil, Ian; Bernstein, Lisa; Last updated - 2011-09-06; SubjectsTermNotLitGenreText - Macneil, Ian; Bernstein, Lisa.

Macchiavello, R. (2010). Development uncorked: Reputation acquisition in the new market for chilean wines in the uk. Technical Report DP7698, CEPR.

Macchiavello, R. and A. Morjaria (2014). The value of relationships: Evidence from a supply shock to kenyan rose exports. Technical report, Warwick University.

MacLeod, W. B. (2007, September). Reputations, relationships and contract enforcement. *Journal of Economics Literature XLV*, 597–630.

MacLeod, W. B. and J. M. Malcomson (1989, March). Implicit contracts, incentive compatibility, and involuntary unemployment. *Econometrica 57*(2), 447–480.

MacLeod, W. B. and J. M. Malcomson (1998, June). Motivation and markets. *American Economic Review 88*(3), 388–411.

MacLeod, W. B. and V. Nakavachara (2007, June). Legal default rules: the case of wrongful discharge laws. *Economic Journal 117*, F1–F62.

MacLeod, W. B. and D. Parent (1999). Job characteristics and the form of compensation. *Research in Labor Economics 18*, 177–242.

MacLeod, W. B. and D. Parent (2014, March 25). Transaction costs and the employment contract in the us economy. *Jouranl of Law, Economics and Organization*. doi:10.1093/jleo/ewu005.

MacLeod, W. B. and M. Urquiola (2013). Anti-lemons: Reputation and educational quality. Mimeo, Columbia University.

MacNeil, I. R. (1974). The many futures of contracts. *Southern California Law Review 47*(688), 691–816.

Macneil, I. R. (2000). Relational contract theory: Challenges and queries. *Northwestern University Law Review 94*(3), 877–907.

Madrick, J. (2014). *Seven Bad Ideas How Mainstream Economists Have Damaged America and the World*. Random House.

Mailath, G. J. and L. Samuelson (2006). *Repeated Games and Reputations: Long-Run Relationships*. New York, NY: Oxford University Press.

McMillan, J. and C. Woodruff (1999). Interfirm relationships and informal credit in vietnam. *Quarterly Journal of Economics 114*(4), 1285–1320. Times Cited: 163 McMillan, J Woodruff, C 165.

Miles, T. J. (2000, Apr). Common law exceptions to employment at will and us labor markets. *Journal of Law Economics & Organization 16*(1), 74–101.

Mincer, J. (1962). On-the-job training: Cost, returns and some implications. *Journal of Political Economy 70*(5), 50–79.

Morrison, A. D. and W. J. Wilhelm (2004, Dec). Partnership firms, reputation, and human capital. *American Economic Review 94*(5), 1682–1692.

Newell, A. and H. Simon (1972). *Human Problem Solving*. Englewood Cliffs, NJ, USA: Prentice Hall.

Nöldeke, G. and K. M. Schmidt (1998, Winter). Sequential investments and options to own. *Rand Journal of Economics 29*(4), 633–653.

Peierls, R. E. (1960). Wolfgang ernst pauli. 1900-1958. *Biographical Memoirs of Fellows of the Royal Society 5*, 175–192.

Popper, K. R. (1963). *Conjectures and Refutations: the Growth of Scientific Knowledge*. New York, NY.: Basic Books.

Posner, R. A. (2011). *Economic Analysis of Law, 8th Edition* (8th Edition ed.). NY, NY, USA: Aspen Publishers.

Rayo, L. (2007). Relational incentives and moral hazard in teams. *Review of Economic Studies 74*(3), 937–963.

Rogers, B. W., T. R. Palfrey, and C. F. Camerer (2009). Heterogeneous quantal response equilibrium and cognitive hierarchies. *Journal of Economic Theory 144*(4), 1440 – 1467.

Rogerson, W. P. (1984, Spring). Efficient reliance and damage measures for breach of contract. *RAND Journal of Economics 15*(1), 39–53.

Schmidt, K. M. and M. Schnitzer (1995). The interaction of explicit and implicit contracts. *Economic Letters 48*, 193–199.

Schwartz, A. (1992, June). Relational contracts in the courts: An analysis of incomplete agreements and judicial strategies. *Journal of Legal Studies 21*, 271–318.

Scott, R. E. (2003, November). A theory of self-enforcing indefinite agreements. *Columbia Law Review 103*(7), 1641–1699. Review.

Sen, A. (1977). Starvation and exchange entitlements - general approach and its application to great bengal famine. *Cambbridge Journal of Economics 1*(1), 33–59.

Shapiro, C. (1983, November). Premiums for high quality products as returns to reputations. *Quarterly Journal of Economics 98*(4), 659–79.

Shapiro, C. and J. E. Stiglitz (1984, June). Equilibrium unemployment as a worker discipline device. *American Economic Review 74*(3), 433–444.

Shearer, B. (2004, Apr). Piece rates, fixed wages and incentives: Evidence from a field experiment. *Review of Economic Studies 71*(2), 513–534.

Shiller, R. J. (2014). Speculative asset prices. *American Economic Review 104*(6), 1486–1517.

Simon, H. A. (1951, July). A formal theory of the employment relationship. *Econometrica 19*, 293–305.

Skinner, J. (2012). Causes and consequences of regional variations in health care1. In M. V. Pauly, T. G. McGuire, and P. P. Barros (Eds.), *Handbook of Health Economics*, Volume 2, Chapter 2, pp. 45–49. Elsevier B. V.

Tadelis, S. (1999, Jun). What's in a name? Reputation as a tradeable asset. *American Economic Review 89*(3), 548–563. Times Cited: 24 Article.

Telser, L. G. (1980, Jan.). A theory of self-enforcing agreements. *Journal of Business 53*(1), 27–44. FLA 00219398 University of Chicago Press Copyright 1980 The University of Chicago Press.

Wang, J., J. Hockenberry, S. Y. Chou, and M. Z. Yang (2011). Do bad report cards have consequences? impacts of publicly reported provider quality information on the cabg market in pennsylvania. *Journal of Health Economics 30*(2), 392–407. Wang, Justin Hockenberry, Jason Chou, Shin-Yi Yang, Muzhe.

Williamson, O. E. (1979). Transaction-cost economics: the governance of contractual relations. *Journal of Law and Economics 22*(2), 233–61.