Continuing Contracts

Maija Halonen-Akatwijuka and Oliver Hart *

October 2017

(first version, August 2016)

Abstract

Parties often regulate their relationships through "continuing" contracts that are not fixed term but roll over: employment is a leading example. Our premise is that parties apply fairness when they revise a continuing contract and that prior terms, together with market information, will be a reference point. A continuing contract can reduce (re)negotiation costs relative to a short-term or long-term contract. However, fair bargaining makes adjusting to outside options difficult and may cause inefficient outcomes. An implicit promise of a long-term relationship, as in employment, can improve matters. We also consider indexed contracts.

Key words: short-term, long-term, continuing contracts, fair bargaining, employment, at-will

JEL codes: D23, D86, K12

*Halonen-Akatwijuka: Department of Economics, University of Bristol (email: maija.halonen@bristol.ac.uk); Hart: Department of Economics, Harvard University (email: ohart@harvard.edu). This is a revised version of Halonen-Akatwijuka and Hart (2015). We would like to thank Oren Bar-Gill, Lucian Bebchuk, Kirill Borusyak, Quinn Curtis, Donald Franklin, Meirav Furth, Andy Garin, Gerald Garvey, Vic Goldberg, Bengt Holmstrom, Louis Kaplow, Larry Katz, Henrik Lando, Bentley MacLeod, John Moore, Jeffrey Picel, Matthew Rabin, Roberta Romano, Julio Rotemberg, Dezso Szalay, Klaus Schmidt, Robert Scott, Kathryn Spier, Paul Tucker, Helene Turon, Massimiliano Vatiero, Birger Wernerfelt, and Luigi Zingales for helpful discussions. We are grateful to Dan Svirsky for research assistance. We have also benefitted from the responses of audiences at the 2014 FOM meeting (University of Southern California), University of Lausanne, Harvard Law School, University of Bristol, University of Toronto, Paris School of Economics, National University of Singapore, Copenhagen Business School, New York University, the 2015 NBER Organizational Economics and Law and Economics meetings, the 2015 ALEA meeting, the 2015 ISNIE meeting, and the 2017 RES meeting. We gratefully acknowledge financial support from the U.S. National Science Foundation through the National Bureau of Economic Research.

1. Introduction

A question that has received little attention from either economists or lawyers is: Why do parties often enter into contractual relationships that are neither long-term nor short-term, but rather are of indefinite duration? Leading examples are employment relationships where each party can often terminate the transaction at will, but where they usually do not – most of the time business continues "as usual"; and rental contracts where the lease is typically renewed, or month to month rental contracts with no lease. We call such relationships and the contracts underlying them "continuing"[1].

The goal of this paper is to provide an analysis of continuing contracts. Our premise is that an ongoing relationship imbues the parties with an obligation and desire to treat each other fairly and reasonably even in the absence of any legal requirements. Specifically, the parties will apply notions of fairness as the relationship evolves and they revise or renegotiate their contract. Further, the prior contract terms are likely to be a very important reference point for determining whether a revision is seen as fair[2]. For example, consider a new wage or rent. Whether this is regarded as reasonable or not will be judged in light of the initial wage or rent: attention will be focused on the *change*. Of course, other factors can be important, such as market conditions, but the prior terms that the parties agreed to will have particular salience. We will be interested in analyzing the consequences of fairness for the choice of an optimal contract. We will argue that using the prior contract as a reference point can have costs as well as benefits. On the one hand it can mean that there is less to argue about if not much has changed in the relationship. On the other hand, it may make it more difficult to take outside options into account, which may cause inefficiency. We will also argue that introducing some "for cause" features into the contract, that is, requiring that the parties have a good reason to leave the relationship, may be a way of mitigating this inefficiency.

To analyze continuing contracts, we apply the contracts as reference points approach developed in Hart and Moore (2008). According to this approach one role of a contract is to get parties "on the same page", so as to avoid future argument about how surplus should be divided. Argument is costly because, even though the parties may reach agreement, at least one of them will typically feel aggrieved and will shade on performance, causing deadweight losses. Hart and Moore (2008) show that, under these

[1] We do not describe the contracts as "indefinite-term contracts" since lawyers already use the term indefinite to describe preliminary agreements that may not be enforceable.

[2] Kahneman et al. (1986), a paper to which we return below, provides considerable support for the idea that past transactions serve as a reference point for future ones. See also Okun (1981). In Akerlof (1982) the fair wage is assumed to depend on the previous wage. Rotemberg (2011) analyzes the optimal pricing policy for a firm that faces consumers who can be antagonized by prices that are higher than usual. Bar-Gill and Ben-Shahar (2003) argue that fairness is an important consideration when contracts are renegotiated and that previously agreed-upon terms will influence what is regarded as fair. See also Benjamin (2015).

conditions, simple contracts can be optimal[3]. So far the contracts as reference points approach has been used to study situations where the current contract is a reference point for contractual revision or renegotiation. We adapt this approach to allow for the prior contract to be a reference point.

We consider a very simple model where a buyer and a seller can trade zero or one widgets in each of two periods. Both parties are risk neutral, there are no non-contractible investments, there is symmetric information, and there are no wealth constraints. It is known that trade is efficient in the first period. If trade is always efficient in the second period a long-term contract mandating trade in both periods (with large damages for non-performance) is optimal. If trade is always inefficient in the second period a classic short-term contract specifying trade in the first period is optimal. But if there is uncertainty about whether there are gains from trade in the second period, neither a long-term contract nor a short-term contract achieves the first-best. A long-term contract can be renegotiated if it is learned that trade is inefficient at the beginning of the second period, but since the parties will argue about how to divide the gains from renegotiation this leads to aggrievement and shading. In the case of a short-term contract, if trade is efficient in the second period, the parties must negotiate a new contract from scratch and because the parties will argue about how to divide the gains from trade, this also leads to aggrievement and shading.

A continuing contract may be a good compromise. To emphasize, we suppose that a continuing contract is one where there is no obligation to trade in the second period but if there are gains from trade the parties will use the first period contract as a reference point (possibly in conjunction with market information). Using the first period contract as a reference point can reduce aggrievement and shading costs since there is less to argue about. For example, suppose that in the first period the buyer's value of trade is 20, the seller's cost is 10 and the price is 15. At the beginning of the second period the parties learn that the seller's second period cost has decreased to 6. Using the first period contract as a reference point means that argument will be confined to how the cost reduction of 4 will be split. This means that the new price will lie between 15 (the seller gets all the cost reduction) and 11 (the buyer gets all the cost reduction). In contrast if the parties bargain from scratch, as in a short-term contract, the argument will be over how to divide the surplus of 14: the price can be anywhere between 20 and 6.

Although the use of the prior contract as a reference point can reduce argument/bargaining costs, problems may arise with respect to outside options. There is considerable evidence that people view changes outside the relationship differently from those inside. Kahneman et al. (1986), using telephone surveys, posed hypothetical situations to people to elicit their standards of fairness. They found that people think that it can be fair for a firm to raise prices when its costs go up or to lower wages if it is losing money, but not fair for it to raise prices if its product becomes scarce or to lower wages if other workers are willing to work for less. Okun (1981) also emphasizes the importance of fairness in determining firms' pricing decisions in what he calls "customer markets". He distinguishes between

[3] Note that the mechanism design critique of the foundations of incomplete contract theory (see Maskin and Tirole (1999)) does not apply to the contracts as reference points approach. For some experimental evidence in support of the Hart-Moore theory, see Fehr et al. (2011), (2015). For some related field evidence, see Iyer and Schoar (2015).

price increases based on cost increases, which are generally accepted as fair, and those based on demand increases, which are generally regarded as unfair (see Okun, pp. 154, 170). Blinder et al. (1998) find empirical support for this idea. However, Kahneman et al. suggest that appealing to outside options may be more acceptable if these outside options represent general market trends[4]. As they put it (p.730), "Some people will consider it unfair for a firm not to raise its wages when competitors are raising theirs. On the other hand, price increases that are not justified by increasing costs are judged less objectionable when competitors have led the way."

To capture these ideas, we introduce an outside market. We suppose that the buyer and seller can operate in this market in the second period but must incur a moving cost to do so: each party's outside option is the maximum of the payoff they obtain in the outside market (which may be negative if moving costs are high) and zero, the payoff they receive from shutting down. Each party's payoff is also subject to a common and idiosyncratic shock. Common shocks affect value and cost both inside the relationship and in the outside market while idiosyncratic shocks affect only outside payoffs (for simplicity). The market-clearing price is observed by both parties, although it is unverifiable (later we allow this price to be verifiable and consider indexed contracts). Each party is willing to adjust their trading price in the direction of the market price if this is necessary to keep a profitable relationship going: such a price adjustment is not seen as unfair since there is an external reference point to support it. However, a price adjustment that is supported neither by changes in value and cost inside the relationship nor by changes in the market price will be regarded as unfair and will not be countenanced. To be more specific, in the above numerical example, if the price has to fall below 11 *and* below the market price to match an outside option, either the buyer feels uncomfortable suggesting this or the seller is unwilling to go along with it; or, if it were to happen, the seller's aggrievement and shading would be so great that the buyer would be worse off accepting the new terms than if she simply quit and took her outside option.

We will show that in the presence of only common shocks the market price will track conditions outside the relationship well enough that an efficient trade can always be achieved (even though there may be aggrievement and shading); whereas, in the case of idiosyncratic shocks, the parties may fail to trade even when it is efficient for them to do so.

Continuing with the numerical example, in the presence of idiosyncratic shocks, the buyer's outside option could be 12 in the second period, but the market price might be 10. (Assume the seller's outside option is zero.) The seller is willing to reduce the price from 15 to the market price 10 even though this

[4] On this point see also http://www.npr.org/blogs/money/2014/02/07/273060341/episode-516-why-paying-192-for-a-5-mile-car-ride-may-be-rational. This podcast discusses whether Uber's strategy of surge pricing is fair, with the conclusion being that while this might be the case if the increase in price is linked to market conditions it would not be so if the price increase depended on the characteristics of individual customers. Interestingly, a rival taxi service in New York, Gett, makes it a selling point that they *never* use surge pricing; see#NYC #NoSurge pic.twitter.com/2pDxUo0jbt (retrieved 4/21/15 at 5:25pm). Another podcast describes how Coca Cola experimented with charging a higher price for coke when the weather was hot but abandoned this policy after consumers became angry: http://www.npr.org/sections/money/2015/06/17/415287577/episode-633-the-birth-and-death-of-the-price-tag.

gives the buyer more than the cost reduction of 4, but not all the way down to 8, which is what is required to keep the buyer in the relationship. Hence the relationship will end even though the surplus from staying together, 14, exceeds the surplus from splitting up, 12.

Can anything be done about this allocational inefficiency? One possibility is to introduce some friction into the quitting process. One interpretation of an employment contract is that it does just that. Many have argued that employment comes with an implicit promise of a long-term relationship (see Osterman (1988), Belous (1989), and Davis-Blake and Uzzi (1993)). This is true even if the contract is formally "at-will". When someone is hired as an employee there is an understanding that the employer will not fire the worker very easily, and that the employee will not quickly look for another job. A similar understanding does not exist in the case of a temporary worker or independent contractor. In other words, the model we have described so far may apply to a temporary worker or independent contractor rather than an employee.

We model the implicit promises of the employment relationship in a simple way: we suppose that the buyer cannot replace the seller just because a cheaper seller is available and the seller cannot replace the buyer just because another buyer is willing to pay more. We show that such a contract can help to reduce the inefficiency that arises in a continuing contract if shocks are idiosyncratic, since it makes it harder for a party to quit. The downside is that an employment contract can make it harder for a party to quit when this is efficient: renegotiation of the employment contract is required, and this is costly. Our theory can throw new light on the trade-off between employment and independent contracting, and provides a possible explanation for the recent shift to flexible employment arrangements in the U.S. and other countries, based on an increased value of flexibility.

In a second extension we consider indexation. If there is an outside market it is plausible that the market price is not only observable but verifiable. In this case, the parties could index the second period price directly to this market price. That is, rather than leaving the second period price open as in a continuing contract, they could fix it in advance. Since our parties are risk neutral and there are no wealth constraints, such price indexation would have no value in a long-term contract, but could be useful if each party has the option not to trade in the second period. We call a contract that specifies the second period price but does not force either party to trade a "renewable" contract. We argue that there are benefits and costs from an indexed renewable contract. The benefit is that, to the extent that the market price tracks conditions both inside and outside the relationship, indexation can ensure an efficient allocation and avoid aggrievement and shading altogether — this will be the case if each party is willing to trade at the indexed price whenever trade is efficient[5]. The cost is that if the market price does not track conditions one or both parties will not want to trade at the indexed price and the contract will have to be renegotiated. We show that an indexed contract works well if moving costs are small and shocks are common and not idiosyncratic, but otherwise a continuing contract can be superior.

[5] Weitzman (1984) and Oyer (2004) argue that firms may index wages to profit or share prices as a way to avoid inefficient quits or lay-offs.

Although throughout we will assume that the parties have a clear-cut choice between a long-term, a short-term, and a continuing contract, this will not always be the case. For example, one of the authors of this paper has rented a vacation house for many years. The relationship as it has developed is best thought of as continuing even though no language was ever used to that effect. More generally, a sequence of short-term contracts may osmose into a continuing contract at some point. At the same time, calling a contract "fixed term" may be a way for the parties to create the expectation that no obligations are owed in the future[6]. Also it is useful to consider the choice of all three contracts – long-term, short-term, continuing – given that economists have traditionally focused on the trade-off between long-term and short-term contracts.

There is a large theoretical literature on the determinants of contract length, and we can mention only a few contributions. Some papers assume a fixed cost of writing a (possibly contingent) contract and derive contract length as a function of the volatility of the environment; see, e.g., Gray (1978) and Dye (1985). Harris and Holmstrom (1987) consider actual duration in a model where new information arrives but as they recognize there is no reason why the initial contract should not have infinite duration. Diamond (1991) argues that short-term contracts might be used by some borrowers to signal that they are of high quality and are willing to expose themselves to the hazards of renegotiation; he does not consider continuing contracts. MacLeod and Malcomson (1993), Che and Hausch (1999), and Segal (1999) identify situations where "no contract" achieves as good an outcome as a sophisticated (incomplete) contract, which can be interpreted as saying that long-term contracts are sometimes not needed; however, they also do not explain why continuing contracts are used.

Finally, Guriev and Kvasov (2005) consider a situation where a seller makes a relationship specific investment and a buyer and seller can trade continuously over time. The buyer has an outside opportunity whose arrival time is stochastic; if it arrives it is efficient for the relationship to terminate. They show that it is optimal for parties to write what they call an evergreen contract – an indefinite contract which can be terminated by the buyer (at some cost) with notice. However, they do not consider what we have called continuing contracts where future terms are left open.

The paper is organized as follows. In Section 2 we present the model and analyze the trade-off between long-term, short-term, and continuing contracts. In Section 3 we study employment contracts, and in Section 4 renewable contracts. Finally, Section 5 concludes.

[6] Kahneman et al. (1986) find that past transactions do not form a reference point if the previous transaction was explicitly temporary, supporting the distinction we make between short-term and continuing contracts. Also Bewley (1999) finds that while wages in the primary sector (long-term employment) are downward rigid, wages in the secondary sector (short-term positions) are flexible downward, again supporting our distinction between short-term and continuing contracts.

2. The Model

We consider a buyer B and a seller S engaged in a two period, three date relationship. See Figure 1 for a time-line. In each period they can trade zero or one widgets.

At date 0, B and S sign an initial contract that may be long-term, short-term, or continuing. This contract is negotiated under competitive conditions at date 0 in the sense that there are many alternative sellers for B. (One can imagine that B auctions off the initial contract to the potential sellers.) Each seller's outside option for the two periods is denoted by $\bar{u} \geq 0$. If the contract is long-term, it may be renegotiated at date 1. If the contract is short-term or continuing, a new contract between B and S may be negotiated at date 1 for the second period.

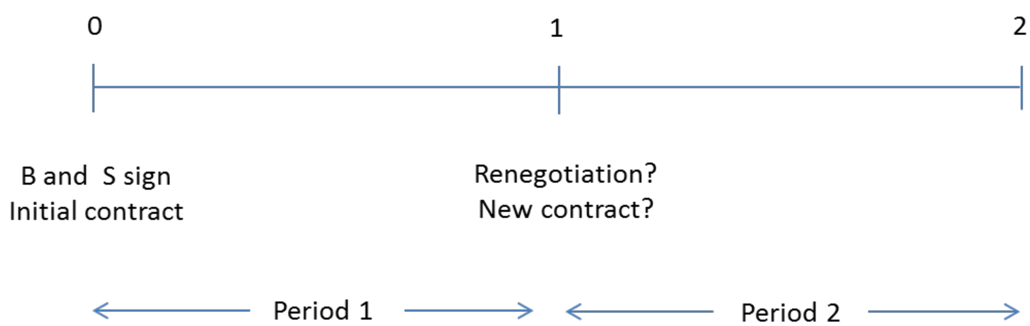

Figure 1

B's value v_1 and S's cost c_1 for the widget in period 1 are already known when the initial contract is written. We assume $v_1 > c_1$. At date 1, before the initial contract is renegotiated or a new contract is signed, B's value v_2, and S's cost c_2, become known to both parties. In addition each party can operate in the outside market at some cost. Let π be the market price of widgets in period 2. We write B's and S's payoffs from operating in the outside market in period 2 as

(2.1) $r_B' = v_2 - \pi + \varepsilon - t,$

(2.2) $r_S' = \pi - c_2 + \varepsilon' - t',$

where $t, t' > 0$ represent the transaction/learning/search costs of moving to the outside market (for simplicity, they are fixed numbers) and the random variables $\varepsilon, \varepsilon'$ capture the idea that part of the value of an outside opportunity is idiosyncratic to this buyer or seller. We suppose ε has support $[\varepsilon^{min}, \varepsilon^{max}]$ and ε' has support $[\varepsilon'^{min}, \varepsilon'^{max}]$. We will be interested in the case where moving costs can be so large that operating in the outside market is unprofitable for one or both of the parties. In this case B and S can also choose not to operate at all; we normalize the no-operation payoff to be zero. Thus we write B and S's outside options as

(2.3) $r_B = Max(r_B', 0),$

(2.4) $r_S = Max(r_S', 0).$

There could also be idiosyncratic components of value or cost within the relationship. For simplicity we ignore these.

In period 2, if $r_B, r_S > 0$, it is first-best efficient for B and S to trade if and only if

(2.5) $v_2 - c_2 > r_B' + r_S' \Leftrightarrow t + t' > \varepsilon + \varepsilon'$.

In other words B and S should stay together unless the idiosyncratic components are sufficiently large and positive to outweigh the moving costs.

At date 0, $v_2, c_2, \pi, \varepsilon, \varepsilon'$ are uncertain – they are drawn from a probability distribution F (which is common knowledge). At date 1, the variables $v_2, c_2, \pi, \varepsilon, \varepsilon'$ are observable but not verifiable. (In Section 4 π is verifiable.) Both parties are risk neutral, there are no wealth constraints, and without loss of generality we suppose no discounting. We assume that the variables are in the range where the buyer wants to offer the seller a contract.

For simplicity we assume that B has all the bargaining power in any negotiation or renegotiation at date 1. Although bargaining at date 1 occurs under symmetric information it is not costless. Following Hart and Moore (2008), we suppose that each party suffers from an (extreme) self-serving bias and believes that he or she is entitled to 100% of the gains from bargaining at date 1. Since at least one of them will be disappointed this leads to aggrievement and shading and consequently deadweight losses. More precisely, if a party receives d dollars less than what he feels entitled to, he is aggrieved by d and hurts the other party by θd, where $0 < \theta < 1$ is an exogenous parameter. The aggrieved party does this by "shading", that is, by being less cooperative or helpful, at the same time as staying within the terms of the contract[7]. Shading, which is non-contractible, has no effect on the payoff of the party doing the shading: it simply hurts the other party.

We will make a related assumption about self-serving biases concerning the adjustment of a continuing contract; this is described in Section 2.3.

In contrast there is no aggrievement or shading at date 0 since the terms of the initial contract are determined competitively and so "there is nothing to argue about": there is no surplus to divide. All these assumptions are discussed at greater length in Hart and Moore (2008).

2.1. Long-term contract

Suppose first that the parties write a long-term contract at date 0, specifying trade in both periods. The long-term contract takes the form of a specific performance contract with large (liquidated) damages if either party breaches. Without loss of generality we can assume the same price in each period, which we denote p. At date 1 the parties will learn v_2, c_2, r_B and r_S. It is efficient for trade to occur in the

[7] As an example of shading, a party could withhold some useful information. Further examples are given in Hart and Moore (2008).

second period if and only if $v_2 - c_2 \geq r_B + r_S$. With a long-term contract renegotiation will therefore occur if $v_2 - c_2 < r_B + r_S$.[8]

Recall that we assume that B has all the bargaining power. Thus, if $v_2 - c_2 < r_B + r_S$, B will offer S an amount $(p - c_2 - r_S)$ in return for not trading. Then, after exercising her outside option, S's second period payoff equals her payoff under the existing contract, $(p - c_2)$. However, S feels entitled to 100% of the gains from renegotiation, that is, to a payoff equal to $r_B + r_S - v_2 + p$ (which would make B's payoff, after exercising his outside option, $v_2 - p$, as under the specific performance contract). S is aggrieved by the difference between what she feels entitled to and what she receives, $r_B + r_S - v_2 + c_2$, and S takes out her aggrievement on B by shading to reduce B's payoff by $\theta(r_B + r_S - v_2 + c_2)$[9].

The bottom line is that, if $v_2 - c_2 < r_B + r_S$, after renegotiation B's second period payoff $= r_B + r_S - p + c_2 - \theta(r_B + r_S - v_2 + c_2)$ and S's second period payoff $= p - c_2$. The deadweight losses from renegotiation $= \theta(r_B + r_S - v_2 + c_2)$.

An important difference from Hart and Moore (2008) should be noted here. In Hart and Moore (2008), it is assumed that a party can shade only if trade takes place: the party hurts the other party during the trading process, e.g., a seller is less cooperative or helpful (but achieves this without violating the contract). Here we assume that S can shade in a renegotiation that leads to no trade (and for simplicity that the shading parameter θ is the same). One way S could shade is by being difficult, disagreeable or unresponsive during the renegotiation process (e.g., S could drag things out by not answering B's phone calls or emails promptly)[10]. Note that we continue to assume that a party can unilaterally quit a relationship without being subject to shading by the other party (see also footnote 12).

With these preliminaries out of the way, we can now turn to an optimal long-term contract. An optimal long-term contract maximizes B's expected payoff subject to S receiving at least $\bar{u}$. That is, it solves:

(2.6) $$Max\ (v_1 - p) + \int_{v_2 - c_2 > r_B + r_S} (v_2 - p)dF + \int_{v_2 - c_2 \leq r_B + r_S} [r_B + r_S - p + c_2 - \theta(r_B + r_S - v_2 + c_2)]dF$$

S.T.

(2.7) $$(p - c_1) + \int (p - c_2)dF \geq \overline{u}.$$

---

[8] For simplicity we assume that the contract always has to be renegotiated to achieve no trade. This might not be the case, however, if $v_2 - r_B < p < c_2 + r_S$ since both parties want to walk away from the contract. Allowing for renegotiation only if $v_2 - r_B > p$ or $c_2 + r_S < p$ would complicate matters without significantly changing our results.

[9] Note that it does not pay B to be generous and give S some of the surplus since an extra dollar for S reduces S's shading by θ, and so B's payoff falls by $1 - \theta$.

[10] Of course, such behavior could also affect S's payoff, something we do not allow for here.

Obviously (2.7) holds with equality since (2.6) is decreasing in p. Letting U_B, U_S be B's and S's overall payoffs, respectively, and substituting (2.7) into (2.6) yields

(2.8)

$$U_B^{LT} = (v_1 - c_1) + \int\limits_{v_2 - c_2 > r_B + r_S} (v_2 - c_2) dF + \int\limits_{v_2 - c_2 \leq r_B + r_S} [r_B + r_S - \theta(r_B + r_S - v_2 + c_2)] dF - \overline{u},$$

$$U_S^{LT} = \overline{u}.$$

In other words, B's payoff equals social surplus net of shading costs minus $\overline{u}$.

We should emphasize that we have considered only a particular kind of long-term contract. More general long-term contracts would allow one or both parties to breach by paying court-imposed or (not so large) liquidated damages. We will consider another type of long-term contract — a renewable contract — in Section 4, but simply note at this point that our results do not change significantly if more general contracts are allowed.

2.2. Short-term contract

We consider next the case where B and S sign a contract that specifies trade only for period 1 *with no commitment, promise, or understanding that the parties will be bound by considerations of fairness or reasonableness if they negotiate a future contract*.

Obviously, if $v_2 - c_2 \leq r_B + r_S$, no trade will occur in period 2. If $v_2 - c_2 > r_B + r_S$, the parties will (re)negotiate from scratch since no promises have been made: the reference point is no trade. B offers S a payoff equal to r_S, but S feels entitled to 100% of the gains from renegotiation, that is, to a payoff of $v_2 - c_2 - r_B$ (which would make B's payoff equal to r_B). Thus S's aggrievement is $A = v_2 - c_2 - r_B - r_S$, shading $= \theta(v_2 - c_2 - r_B - r_S)$, and B's net payoff $= r_B + (1-\theta)(v_2 - c_2 - r_B - r_S)$ while S's payoff is r_S.

Let p_1 be the first period price. An optimal short-term contract solves:

(2.9) $Max\ (v_1 - p_1) + \int r_B dF + \int_{v_2 - c_2 > r_B + r_S} (1-\theta)(v_2 - c_2 - r_B - r_S) dF$

S.T.

(2.10) $(p_1 - c_1) + \int r_S dF \geq \overline{u}.$

Again (2.8) holds with equality since B can always gain from reducing p_1. Hence

(2.11) $U_B^{ST} = (v_1 - c_1) + \int (r_B + r_S)dF + \int_{v_2 - c_2 > r_B + r_S} (1-\theta)(v_2 - c_2 - r_B - r_S)dF - \overline{u},$

$U_S^{ST} = \overline{u}.$

As above, B's payoff equals social surplus net of shading costs minus $\overline{u}$.

2.3. Continuing contract

We now turn to what we call a continuing contract. A continuing contract is a contract that specifies trade in the first period, does not commit the parties to trade in the second period, *but includes some commitment, promise, or understanding that the parties will be bound by considerations of fairness or reasonableness if they do negotiate a future contract*.

It is convenient to start with the case where the outside options are zero at date 1, $r_B \equiv r_S \equiv 0$ (that is, $r_B' \leq 0, r_B' \leq 0$).

2.3.1. Continuing contract with zero outside options

At date 1, if $v_2 - c_2 \leq 0$, the parties walk away.[11] However, if $v_2 - c_2 > 0$, they bargain using the period 1 contract as a reference point. If conditions have not changed much, that is, $v_2 \approx v_1, c_2 \approx c_1$, then fair bargaining means that the price should not change much. (There is an exception to this, noted below, if $p_1 < c_1$ or $p_1 > v_1$.) On the other hand, if v_2 or c_2 do change relative to v_1, c_1, then fair bargaining means that the price can change but only commensurate with the changes in v and c.

The parties are subject to self-serving biases. In Section 2.2 we assumed that each party feels entitled to 100% of any change in surplus. But that was for the case where the change was always positive. We now assume that B and S's self-serving biases are such that each party feels entitled to any increase in value and reduction in cost but feels that the other should suffer any decrease in value and increase in cost. However, each party recognizes that they cannot force the other party to trade at a negative profit.

Before continuing, we should note that although we focus on this simple assumption on entitlements, in Section 5 we discuss how our results are robust to alternative formulations where self-serving biases are less extreme or where entitlement can depend also on the market price.

To be more formal, B thinks that a reasonable price is given by

(2.12) $\underline{p} = p_1 + Min(v_2 - v_1, 0) + Min(c_2 - c_1, 0),$

[11] We are ruling out the possibility that one or other party might feel aggrieved and shade in the event that trade does not occur given that it could have; for example, if S's cost is low she might be angry with B that his value is even lower. One justification, consistent with Hart and Moore (2008), is that it is difficult for a party to hurt another party who walks away: shading can occur only if trade takes place or if a renegotiation is required. (Of course, particularly these days, you can hurt someone by bad-mouthing them or posting negative comments on a website, but the damage may be less than if you are in a relationship with them.)

but will adjust this to

(2.13) $\underline{p}' = Min(v_2, Max(\underline{p}, c_2))$

to ensure that S breaks even (and that B breaks even)[12].

Similarly, S thinks that a reasonable price is given by

(2.14) $\overline{p} = p_1 + Max(v_2 - v_1, 0) + Max(c_2 - c_1, 0),$

but will adjust this to

(2.15) $\overline{p}' = Min(v_2, Max(\overline{p}, c_2))$

to make sure that B breaks even (and that S breaks even).

B will offer $\underline{p}'$, S feels entitled to $\overline{p}'$, S is aggrieved by ($\overline{p}' - \underline{p}'$), and shades by $\theta\left(\overline{p}' - \underline{p}'\right)$. B's and S's period 2 payoffs are given by

(2.16) $U_B^2 = v_2 - \underline{p}' - \theta\left(\overline{p}' - \underline{p}'\right),$

(2.17) $U_S^2 = \underline{p}' - c_2$

if $v_2 - c_2 > 0$ and zero otherwise.

An example may help. Suppose that $v_1 = 20,\ c_1 = 10$ and $p_1 = 15$. Assume that at date 1 it is learned that $v_2 = 24,\ c_2 = 10$. Then with a continuing contract B will regard 15 as the appropriate price (this gives all the value increase to B), while S will regard 19 as the appropriate price (this gives all the value increase to S). B will offer 15 but S will be aggrieved by 4 and will shade by 4θ.

Suppose instead that it is learned that $v_2 = 14,\ c_2 = 10$. Now B regards 9 as the right price since this makes S bear the full decrease in value. However, S will not break even at 9 and so B adjusts his notion of entitlement so that 10 becomes a reasonable price. S regards 15 as a reasonable price by a similar argument, but since B will not break even at this price she adjusts her entitlement to 14. Thus B will offer 10 but S will be aggrieved by 4 and will shade by 4θ.

Given the above, an optimal continuing contract solves:

(2.18) $Max\ (v_1 - p_1) + \int_{v_2 > c_2}\left(v_2 - \underline{p}' - \theta\left(\overline{p}' - \underline{p}'\right)\right) dF$

S.T.

(2.19) $(p_1 - c_1) + \int_{v_2 > c_2}\left(\underline{p}' - c_2\right) dF \geq \overline{u}.$

---

[12] If $p_1 > v_1$, $Max(\underline{p}, c_2)$ could exceed v_2, which is why we require $\underline{p}' \leq v_2$.

It is easy to see that (2.19) holds with equality: if not, reducing p_1 a little reduces $\underline{p}'$ and $\overline{p}'$ and hence $(1-\theta)\,\underline{p}' + \theta\overline{p}'$, which increases (2.18)[13]. Substituting (2.19) into (2.18) we can write the parties' payoffs as

(2.20) $U_B^C = (v_1 - c_1) + \int_{v_2 > c_2} \left[v_2 - c_2 - \theta\left(\overline{p}' - \underline{p}'\right)\right] dF - \overline{u},$

$U_S^C = \overline{u}.$

Note that p_1 affects $\left(\overline{p}' - \underline{p}'\right)$ and so is still present in (2.20). Thus in contrast to a short-term or long-term contract it is not the case that U_B^C changes one to one with $\overline{u}$.

In the case of zero outside options it is easy to show that a continuing contract is always at least as good for B as a short-term contract (S is indifferent since she always gets $\overline{u}$).

Proposition 1

With zero outside options, a continuing contract is superior to a short-term contract.

Proof: Consider an optimal continuing contract. We know from (2.20) that

(2.21) $U_B^C = (v_1 - c_1) + \int_{v_2 > c_2} \left[v_2 - c_2 - \theta\left(\overline{p}' - \underline{p}'\right)\right] dF - \overline{u}$

$\geq (v_1 - c_1) + \int_{v_2 > c_2} (1-\theta)(v_2 - c_2) dF - \overline{u} = U_B^{ST},$

where the inequality follows from the fact that $\overline{p}' - \underline{p}' \leq v_2 - c_2$. Q.E.D.

In other words, in this simple setting, fair bargaining is always a plus: it reduces aggrievement and shading since, with the first period contract as a reference point, there is less to argue about in period 2. (In the above example there was strictly less to argue about in the first case where surplus went up and the same amount to argue about in the second case where surplus went down.)

Concerning the comparison of a continuing contract and a long-term contract, each can be optimal under some circumstances. Obviously, a long-term contract is good if it is very likely that trade in the

[13] Note that p_1 plays two roles. It acts as a reference point for the period 2 price and it also serves to distribute surplus. We are ruling out the possibility that a lump sum transfer can be used to distribute surplus independently of the first period price. Our assumption is that, if this were attempted, the parties would "see through it" and use the average of the two as a reference point.

second period is efficient. A continuing contract is good if conditional on trade being efficient value and cost will not change much from period 1 to period 2, but there is also a significant chance that second period trade is inefficient. Under these conditions there is little to argue about in the event that trade should take place while if trade is inefficient the parties go their separate ways.

We say that a contract achieves the first-best if the allocation in period 2 is efficient, there is no shading, and the seller's participation constraint is binding (S receives $\overline{u}$). Obviously, a first-best contract is optimal for B. We summarize some of the above discussion in Proposition 2.

Proposition 2

A sufficient condition for a continuing contract to achieve the first-best is that $Prob(v_2 = v_1, c_2 = c_1 | v_2 - c_2 > 0) = 1$.

Proof:

Either $v_2 < c_2$ and the parties walk away or $v_2 > c_2$ and there is nothing to argue about in period 2: B and S agree that the price should stay the same (or if $p_1 > v_1$ that price should equal v_2). Also p_1 can be adjusted so that S receives $\overline{u}$ and B obtains all the surplus. Q.E.D.

To put Proposition 2 in everyday language a continuing contract works well if it is known in advance that either business will remain as usual or a big change will occur that will make it efficient for the relationship to break up. Then either the parties agree that they should trade at the previous price or they simply walk away[14].

As a simple example, suppose $v_1 = 20$, $c_1 = 10$; and with probability ½ $v_2 = 20$, $c_2 = 10$, while with probability ½ $v_2 < c_2$. Then a continuing contract achieves the first-best, whereas there is shading with probability ½ under a long-term contract.

[14] A qualification should be noted. We have assumed that v_1, c_1 are known for sure. But suppose, say, that the buyer is uncertain about the suitability of the seller's product. Then v_1 represents an expected value. If the buyer learns that the product is suitable the value in the second period will be higher even if nothing else has changed. It seems reasonable that fair bargaining now means that the price should not change even though $v_2 > v_1$. Our analysis, and Proposition 2, can be extended to this case.

2.3.2 Continuing contract with positive outside options

We turn to the case where outside options can be positive. At date 1, if $v_2 - c_2 \leq r_B + r_S$, the parties walk away and take their outside options. However, if $v_2 - c_2 > r_B + r_S$, they bargain using the period 1 contract as a reference point. Each party behaves in what they think of as a fair and reasonable way, but is subject to self-serving biases. We model this as in Section 2.3.1, but with the following modification.

We saw in Section 2.3.1 that B regards $\underline{p}'$as a reasonable price. However, if B offers $\underline{p}'$, S will quit if $\underline{p}'$ $- c_2 < r_S$. We suppose that B is willing to make two kinds of adjustment to prevent S from quitting inefficiently. First, B is willing to adjust the price toward the market price π. This adjustment keeps S in the relationship as long as $\pi - c_2 \geq r_S = \pi - c_2 + \varepsilon' - t'$. The adjustment is clearly sufficient if $\varepsilon' < t'$. However, if $\varepsilon' > t'$ an adjustment beyond π may be needed to avoid an inefficient quit. Second, B is willing to look at things from S's point of view and ascribe some or all of the favorable changes to S and some or all of the unfavorable changes to himself if that is what it takes to keep the relationship going. In both cases the adjustment B makes is the minimum necessary. (B is also willing to make similar adjustments to stop himself from quitting.)

S will make the same kinds of adjustments in what she feels entitled to. Again the adjustments will be the minimum necessary.

We may conclude that B will adjust his offer in (2.13) to

(2.22) $\underline{p}'' = \underline{p}'$ if $\underline{p}' \in [c_2 + r_S, v_2 - r_B]$,

$c_2 + r_S$ if $\underline{p}' - c_2 < r_S$ and either $\pi - c_2 \geq r_S$ or $\overline{p}' - c_2 \geq r_S$,

$v_2 - r_B$ if $v_2 - \underline{p}' < r_B$ and $v_2 - \pi \geq r_B$,

where we are using the fact that $\overline{p}' \geq \underline{p}'$.

Similarly, S will adjust the price she thinks is reasonable in (2.15) to

(2.23) $\overline{p}'' = \overline{p}'$ if $\overline{p}' \in [c_2 + r_S, v_2 - r_B]$,

$c_2 + r_S$ if $\overline{p}' - c_2 < r_S$ and $\pi - c_2 \geq r_S$,

$v_2 - r_B$ if $v_2 - \overline{p}' < r_B$ and either $v_2 - \pi \geq r_B$ or $v_2 - \underline{p}' \geq r_B$.

On the other hand, the relationship will dissolve even though it is productive, if

(2.24) either $Max(\pi, \overline{p}') - c_2 < r_S$, or $v_2 - Min\left(\underline{p}', \pi\right) < r_B$.

(2.24) describes the case where either B is unable to find a rationale for raising the price to $c_2 + r_S$ or S is unable to find a rationale for reducing the price to $v_2 - r_B$.

If trade occurs, S's aggrievement is given by $A = \overline{p}'' - \underline{p}''$, she shades by θA, and B's and S's period 2 payoffs are given by

(2.25) $U_B^2 = v_2 - \underline{p}'' - \theta\left(\overline{p}'' - \underline{p}''\right)$,

(2.26) $U_S^2 = \underline{p}'' - c_2$.

On the other hand, if (2.24) holds, and trade does not occur, or if $v_2 - c_2 \leq r_B + r_S, U_B^2 = r_B, U_S^2 = r_S$.

We illustrate the above with some examples.

(1) Suppose that $v_1 = 20$, $c_1 = 10$ and $p_1 = 15$. Assume that at date 1 it is learned that $v_2 = 20$, $c_2 = 6$ and $\pi = 13$. Outside options are $r_B = r_S = 1$. Then with a continuing contract B will regard 11 as the appropriate price (this gives all the cost reduction to B), while S will regard 15 as the appropriate price (this gives all the cost reduction to S). Both prices are in the $[c_2 + r_S, v_2 - r_B]$ range and so will not be adjusted. B will offer 11 but S will be aggrieved by 4 and will shade by 4θ.

(2) Same now except that $r_S = 6$. (Note that this requires $\varepsilon' < t'$ since $r_S = \pi - c_2 + \varepsilon' - t'$.) B still thinks that 11 is the right price but is willing to raise the price to 12 to keep the relationship going since the market price is above 12. S still thinks that 15 is the right price and so will be aggrieved by 3 and will shade by 3θ.

(3) Same now except that $r_S = 6$ and $\pi = 10$. (Note that this requires $\varepsilon' > t'$.) B still thinks that 11 is the right price but is willing to raise the price to 12 to keep S in the relationship given that this is less than what S would obtain if all the cost reduction were ascribed to her (which would be 15).

(4) Same now except that $r_S = 10$ and $\pi = 10$. Since B is not willing to adjust the price above 15 on the basis of either changes in value or cost inside the relationship or the market price the relationship ends inefficiently.

Given the above, an optimal continuing contract solves:

(2.27) $$Max\ (v_1 - p_1)$$

$$+ \int_{v_2 - c_2 > r_B + r_S, Max(\pi, \overline{p}') - c_2 \geq r_S, v_2 - Min(\underline{p}', \pi) \geq r_B} \left(v_2 - \underline{p}'' - \theta\left(\overline{p}'' - \underline{p}''\right)\right) dF + \int_{v_2 - c_2 \leq r_B + r_S} r_B dF$$

$$+ \int_{v_2 - c_2 > r_B + r_S\ , Max(\pi, \overline{p}') - c_2 < r_S\ or\ v_2 - Min(\underline{p}', \pi) < r_B} r_B dF$$

S.T.

(2.28) $$(p_1 - c_1) + \int_{v_2 - c_2 > r_B + r_S, Max(\pi, \overline{p}') - c_2 \geq r_S, v_2 - Min(\underline{p}', \pi) \geq r_B} \left(\underline{p}'' - c_2\right) dF + \int_{v_2 - c_2 \leq r_B + r_S} r_S dF$$

$$+ \int_{v_2 - c_2 > r_B + r_S\ , Max(\pi, \overline{p}') - c_2 < r_S\ or\ v_2 - Min(\underline{p}', \pi) < r_B} r_S dF \geq \overline{u}.$$

In general, (2.28) may not be binding at the optimum. The reason is that (2.27) may not be monotonic in p_1 given that a lower p_1 may lead to inefficient outcomes. In other words an "efficiency" wage (or price) may be optimal. We will return to this possibility below.

One case where (2.28) *is* binding is when idiosyncratic shocks are small, that is, if $\varepsilon^{max} < t$ and $\varepsilon'^{max} < t'$. These conditions are satisfied, for example, when outside options are based on common shocks ($\varepsilon = \varepsilon' = 0$).

Lemma 1

If $\varepsilon^{max} < t, \varepsilon'^{max} < t'$, a continuing contract yields trade if and only if it is efficient, and S's participation constraint is binding in an optimal contract.

Proof: If $\varepsilon^{max} < t, \varepsilon'^{max} < t'$, then, since

$$r_B' = v_2 - \pi + \varepsilon - t,$$

$$r_S' = \pi - c_2 + \varepsilon' - t',$$

we must have

$$r_B' < v_2 - \pi,$$

$$r'_S < \pi - c_2.$$

If $r'_B > 0$, we have $r_B = r'_B$, and so the second part of (2.24) is not satisfied. If $r'_B \leq 0$, we have $r_B = 0$, and the second part of (2.24) is again not satisfied since $v_2 - \underline{p}' \geq 0$. A similar argument applied to r'_S and r_S shows that the first part of (2.24) is not satisfied. Hence trade takes place when it is efficient (and the parties walk away when it is not).

It is easy to check that $\underline{p}'', \overline{p}''$ are non-increasing in p_1, and so, given that trade is efficient, B can always gain by reducing p_1 until (2.28) is binding. Q.E.D.

Since trade is efficient and S's participation constraint is binding, we can write B's payoff in (2.27) as

(2.29) $(v_1 - c_1) + \int_{v_2 - c_2 \geq r_B + r_S} \left(v_2 - c_2 - \theta(\overline{p}'' - \underline{p}'')\right) dF + \int_{v_2 - c_2 < r_B + r_S} (r_B + r_S) dF \; - \; \overline{u}.$

Proposition 3 follows immediately.

Proposition 3

If $\varepsilon^{max} < t, \varepsilon'^{max} < t'$, a continuing contract is superior to a short-term contract.

Proof:

Trading is efficient in both kinds of contracts. But shading $= \theta(v_2 - c_2 - r_B - r_S)$ in a short-term contract when trade takes place. Since $\overline{p}'' - \underline{p}'' \leq v_2 - c_2 - r_B - r_S$, shading in a continuing contract can never exceed this. Q.E.D.

In words, if idiosyncratic shocks are small, fair bargaining is always a plus (as in the case of zero outside options): it reduces aggrievement and shading since, with the first period contract as a reference point, there is less to argue about in period 2.

Proposition 4 generalizes Proposition 2 to the case of positive outside options when idiosyncratic shocks are small.

Proposition 4

Assume $\varepsilon^{max} < t,\ \varepsilon'^{max} < t'$. Suppose $Prob(v_2 = v_1, c_2 = c_1 | v_2 - c_2 > r_B + r_S) = 1$. Then a continuing contract achieves the first-best.

Proof:

Note that if $v_2 - c_2 \leq r_B + r_S$, the parties walk away. If $v_2 - c_2 > r_B + r_S$ by fair bargaining the price can change only if a price change is necessary to match an outside option. In this case, by (2.22) – (2.23), the parties agree on what the price should be — it is either p_1 or the minimum adjustment in the direction of π to prevent a quit — and so there is no shading. By Lemma 1 trade is efficient and S receives $\overline{u}$. Thus the first-best is achieved. Q.E.D.

We turn now to the case where idiosyncratic shocks can be significant. Under these conditions, neither Lemma 1 nor Proposition 3 necessarily holds: S's participation constraint may not be binding and a continuing contract may be dominated by a short-term contract. Example 2.1 illustrates these possibilities.

Example 2.1

There is no uncertainty, $v_1 = 20, c_1 = 10, v_2 = 20, c_2 = 10,\ r_B$ is small, $r_S = 1, \pi = 10,\ \overline{u} = 1$.

Note that $\varepsilon' > t'$ since otherwise $r_S' = \pi - c_2 + \varepsilon' - t' < \pi - c_2 = 0$.

Consider a continuing contract. Suppose $10 \leq p_1 \leq 20$. Since $v_2 = v_1,\ c_2 = c_1,\ \overline{p} = \underline{p} = p_1$. Hence, given S's outside option in period 2 and $\pi = 10$, trade will occur in period 2 only if $p_2 = p_1 \geq 11$. Given $p_1 \geq 11$, it is optimal for B to set $p_1 = 11$: this ensures trade in both periods and yields $U_B = 18, U_S = 2$. Alternatively, if $p_1 < 11$, no trade occurs in period 2 even though trade is efficient. It is then best for B to set $p_1 = 10$. This yields $U_B = 10,\ U_S = 1$. (It is easy to show that $p_1 < 10$ or $p_1 > 20$ is not optimal.)

Obviously the first contract is superior, and this gives S more than her reservation utility $\overline{u}$. As promised S's participation constraint is not binding.

Now let's compare the optimal continuing contract with a short-term contract. Under a short-term contract

$$U_S^{ST} = p_1 - c_1 + r_S = \overline{u}$$

and so $p_1 = 10$. Hence

$$U_B^{ST} = 10 + (1-\theta)9 = 19 - 9\theta$$
$$> 18 = U_B^{CI}$$

if $\theta < \frac{1}{9}$.

In other words, if $\theta < \frac{1}{9}$, a short-term contract is superior to a continuing contract: the reason is that the shading cost is less than the cost of offering S an efficiency wage.

Of course, in this example, with no uncertainty, a long-term contract achieves the first-best since trade is always efficient. However, it is easy to construct a version of Example 2.1 with uncertainty where for some parameters a short-term contract is optimal; and for other parameters a continuing contract is optimal and the seller receives a utility level strictly above $\overline{u}$. See Halonen-Akatwijuka and Hart (2015).

3. Employees, temporary workers, and independent contractors

We saw in Example 2.1 that with significant idiosyncratic shocks a continuing contract can lead to an inefficient outcome: an agent will leave the relationship if price cannot adjust to meet his outside option. We now explore one way the parties can mitigate this effect: by entering into an employment relationship.

There are many differences between the position of an employee and that of a temporary worker or independent contractor, but one that seems important is the planned or intended length of the relationship. Many have argued that employment comes with an implicit promise of a long-term relationship (see Osterman (1988), Belous (1989), and Davis-Blake and Uzzi (1993)). When someone is hired as an employee there is an understanding that the employer will not fire the worker very easily, and that the employee will not quickly look for another job. A similar understanding does not exist in the case of a temporary worker or independent contractor[15].

We should emphasize that this understanding or norm is not inconsistent with the fact that in many jurisdictions in the U.S. an employer can fire an employee “at will.” There is a large difference between a situation where an employer enters into an informal understanding that he will not fire an employee easily and one where he has to demonstrate in a court of law that he has cause to fire an employee[16].

---

[15] Abraham and Taylor (1996, p.418) find evidence consistent with the idea that employers attach value to maintaining stable relationships with their regular employees.

[16] Of course, in many countries and also in some parts of the U.S., “for-cause” is a legal requirement in an employment contract. The results below show why this might be efficiency-enhancing but do not explain why parties do not reach these agreements themselves, that is, why a law is required. It is for this reason that we prefer to rely on the idea of informal understandings as what distinguish employment from temporary work or independent contracting.

One way to interpret the implicit understanding surrounding employment is that the employer will dismiss an employee only for a "good reason".[17] A good reason might be that the employee misbehaves or the firm is down-sizing. Most people would not think that the availability of someone else willing to do the work more cheaply constitutes a good reason[18]. Our model does not encompass misbehavior and so we focus on down-sizing as the only good reason for dismissing an employee.

It is perhaps hard to argue that a similarly strong norm exists on the employee side. Employees often quit simply because they have found a better job. But an employee who quits too easily or quickly will suffer some reputational loss. Also in many cases an employee will feel some loyalty to an employer if the relationship has been going well, which will make her reluctant to leave. Finally, employment contracts sometimes contain covenants not to compete, which can make quitting unattractive.

Thus, we would argue that some stickiness exists on the employee side too relative to the case of a temporary worker or independent contractor.

In any event, in this section we will define an employment contract to be a continuing contract where each party can leave the relationship only for a good reason. Specifically, B can refuse to trade with S in the second period if he claims that production is unprofitable, but then B cannot operate at all; and S can refuse to trade with B if she claims that trade is unprofitable, but then S cannot operate.

We will allow the parties to renegotiate an employment contract ex post.

In contrast, we will refer to the continuing contracts of Section 2.3 as "at-will" continuing contracts. We can interpret them as describing a situation of independent contracting or temporary employment[19].

To analyze the optimal employment contract, suppose first that B and S learn at date 1 that $v_2 - c_2 \geq r_B + r_S$. Then the contract will not be renegotiated since trade is efficient. The outside options are irrelevant since neither party can walk away. Hence the analysis is as in Section 2.3., where we set $r_B = r_S = 0$. B will offer S

(3.1) $\underline{p}' = Min\left(v_2, Max\left(\underline{p}, c_2\right)\right)$,

and S will shade by $\theta\left(\overline{p}' - \underline{p}'\right)$, where

(3.2) $\overline{p}' = Min\big(v_2, Max(\overline{p}, c_2)\big)$.

The parties' period 2 payoffs are

---

[17] Many private firms specify reasons needed for dismissal in their personnel policies (Autor, 2003).

[18] Bewley (1999) finds that employers rarely dismiss employees in order to replace them with cheaper workers.

[19] This is not the only way to view an arrangement with a temporary worker or independent contractor. In some cases such an arrangement might be closer to a short-term contract than a continuing contract, in the sense that not only is there no obligation not to trade with anyone else in the future, but also there is no understanding that the previous contract will be a reference point if the relationship continues.

(3.3) $U_B^2 = v_2 - \underline{p}' - \theta\left(\overline{p}' - \underline{p}'\right)$,

(3.4) $U_S^2 = \underline{p}' - c_2$.

Suppose next that $v_2 - c_2 < r_B + r_S$. Then renegotiation will occur to allow the parties to trade elsewhere. There are two subcases. If $v_2 \leq c_2$, in the absence of renegotiation the parties would not trade and so each would get a payoff of zero. In this subcase B will offer S $-(r_S)$, S will feel entitled to r_B, and S will shade by $\theta(r_B + r_S)$. The period 2 payoffs are

(3.5) $U_B^2 = (1-\theta)(r_B + r_S)$,

(3.6) $U_S^2 = 0$.

The second subcase is where $v_2 > c_2$. Then in the absence of renegotiation B and S would bargain fairly and agree to trade. The analysis of fair bargaining is the same as in Section 2.3. B will offer $\underline{p}'$, and S will feel entitled to $\overline{p}'$. S's payoff $= \underline{p}' - c_2$ and B's payoff $= v_2 - \underline{p}' - \theta\left(\overline{p}' - \underline{p}'\right)$. Consider now the renegotiation to allow the parties to trade elsewhere. B will offer S $-r_S + \underline{p}' - c_2$ so that after exercising her outside option S's payoff equals her payoff under the existing contract. S will feel entitled to $r_B - v_2 + \underline{p}' + \theta\left(\overline{p}' - \underline{p}'\right)$ (which would make B's payoff, after exercising his outside option, equal to his payoff under the existing contract). S's total shading $= \theta\left(r_B + r_S - v_2 + c_2 + \theta\left(\overline{p}' - \underline{p}'\right)\right)$. Thus period 2 payoffs will be given by

(3.7) $U_B^2 = r_B + r_S - \underline{p}' + c_2 - \theta\left(r_B + r_S - v_2 + c_2 + \theta\left(\overline{p}' - \underline{p}'\right)\right)$,

(3.8) $U_S^2 = \underline{p}' - c_2$.

It follows that an optimal employment contract solves:

$$(3.9) \quad Max\ (v_1 - p_1) + \int_{v_2 - c_2 \geq r_B + r_S} \left(v_2 - \underline{p}' - \theta\left(\overline{p}' - \underline{p}'\right)\right) dF + \int_{v_2 \leq c_2} [(1-\theta)(r_B + r_S)] dF$$

$$+ \int_{v_2 - c_2 < r_B + r_S, v_2 > c_2} \left[r_B + r_S - \underline{p}' + c_2 - \theta\left(r_B + r_S - v_2 + c_2 + \theta\left(\overline{p}' - \underline{p}'\right)\right)\right] dF$$

S.T.

$$(3.10) \quad (p_1 - c_1) + \int_{v_2 > c_2} \left(\underline{p}' - c_2\right) dF \geq \overline{u}.$$

Under an employment contract the inefficiency that can arise under an at-will continuing contract (see example 2.1) does not occur. In particular, trade takes place whenever $v_2 - c_2 > r_B + r_S$, since neither party can quit without renegotiation.

It is easily seen that B's payoff in (3.9) is decreasing in p_1: a reduction in p_1 reduces $(1-\theta)\,\underline{p}' + \theta\overline{p}'$. Hence (3.10) will be binding at an optimum. (Recall that this is also true for long-term and short-term contracts but was not true for continuing contracts with large idiosyncratic shocks.) We can therefore write B's payoff as

$$(3.11)\quad U_B^E = (v_1 - c_1) + \int_{v_2 - c_2 \geq r_B + r_S} \left(v_2 - c_2 - \theta(\overline{p}' - \underline{p}')\right) dF + \int_{v_2 \leq c_2} [(1-\theta)(r_B + r_S)] dF$$

$$+ \int_{v_2 - c_2 < r_B + r_S, v_2 > c_2} \left[r_B + r_S - \theta\left(r_B + r_S - v_2 + c_2 + \theta\left(\overline{p}' - \underline{p}'\right)\right)\right] dF \; - \overline{u},$$

while

$$(3.12)\quad U_S^E = \overline{u}.$$

It is easy to establish

Proposition 5

If $\varepsilon^{max} < t, \varepsilon'^{max} < t'$, an at-will continuing contract is superior to an employment contract.

Proof:

Compare (2.29) and (3.11) and note that, as is easily shown, $\overline{p}'' - \underline{p}'' \leq \overline{p}' - \underline{p}'$. Q.E.D.

This proposition tells us that employment contracts will not improve upon at-will continuing contracts in the presence of small idiosyncratic shocks. Since price can adjust to meet outside options under an at-will contract, there is no reason to constrain people from taking them. Also, when it is efficient for the parties to split up, no renegotiation is required.

In the presence of large idiosyncratic shocks, employment contracts can be useful to prevent parties from quitting inefficiently. In particular, trade will always occur when $v_2 - c_2 > r_B + r_S$. On the other hand, employment contracts involve renegotiation costs if $v_2 - c_2 < r_B + r_S$ and it is efficient for the parties to go to the outside market.

Proposition 6 provides sufficient conditions for an employment contract to achieve the first-best.

Proposition 6

Suppose $Prob(v_2 = v_1, c_2 = c_1 | v_2 - c_2 > r_B + r_S) = 1$ and $Prob(r_B = r_S = 0 | v_2 - c_2 \leq r_B + r_S) = 1$. Then an employment contract achieves the first-best.

Proof:

Suppose trade is efficient. Then the contract will not be renegotiated and since value and cost do not change there is nothing to argue about. On the other hand, if trade is inefficient outside options are zero and so $v_2 \leq c_2$. Since there is no surplus to bargain over the parties simply walk away. Finally, in an employment contract the seller receives $\overline{u}$. Q.E.D.

Proposition 6 can be interpreted as saying that an employment contract is good if either business is as usual or a big change will occur so that the gains from trade vanish both in the relationship and outside. The advantage compared to the at-will contract of Proposition 4 is that idiosyncratic shocks can be large without disrupting the relationship when trade is efficient. However, a first-best employment contract requires a stronger condition for the states when trade is inefficient. Renegotiating an employment contract is costless only when the gains from trade have vanished also outside the relationship as then there is no surplus to bargain over. In contrast, an at-will contract can be first-best even when $v_2 - c_2 < r_B + r_S$ implies that one party will take a positive outside option[20].

We are not aware of a substantial prior literature that tries to explain for-cause contracts (which we have called employment contracts). Levine (1992) shows that for-cause contracts are underprovided in the market although they could allow the firm to pay lower efficiency wages because they would attract employees talented in providing low effort without leaving a trail of evidence. Autor (2003) argues that for-cause contracts (on the firm side) are useful to encourage workers to make non-contractible specific investments. However, his model supposes that the firm incurs a cost of firing without cause that the parties cannot bargain around. Our explanation is that employment contracts can be useful to prevent parties from quitting in situations where quitting is inefficient but price cannot adjust to meet idiosyncratic outside options.

The above analysis provides a possible explanation of the recent shift to flexible employment arrangements in the U.S. and other countries, as documented by Katz and Krueger (2017) and Weil (2014). Suppose that as a result of new technology and increased off-shoring possibilities the value of flexibility has increased: the possibility of disruptive shifts means that it is more likely that the buyer and seller should find new partners (so that the second condition in Proposition 6 is violated). Assume

[20] Note that the assumption that the idiosyncratic shocks are small in Proposition 4 is inconsistent with *both* agents taking a positive outside option when trade is inefficient.

further that in the absence of disruptive shifts business is "as usual". Then, according to Proposition 4, an at-will contract is optimal. It would seem useful to pursue this idea in future work[21].

4. Indexed contracts

So far we have supposed that the market price π is observable but not verifiable. However, if there is a well-defined outside market it is plausible that π is verifiable. In this case the parties could index their contract directly to π. We now consider this possibility.

Several kinds of indexation are possible. The parties could select a long-term contract and index the quantity traded ($q = 0$ or 1) to π in an attempt to ensure that trade occurs only when it is efficient. In this section we study instead a "renewable" contract. A renewable contract is a contract that specifies a first period price and a second period price if trade occurs, but allows either party to walk away in the second period[22]. Since we are interested in indexation we allow the second period price p_2 to depend on π. For simplicity, we focus on the case of full indexation where $p_2 = \pi$, but we will also say a few words about the case where p_2 is a constant. Of course, a general analysis would consider cases of partial indexation.

A fully indexed contract can be represented by a first period price p_1 and a second period price π.

Trade occurs in the second period if

(4.1) $v_2 - \pi \geq r_{B,}$

(4.2) $\pi - c_2 \geq r_S$.

If one of (4.1) – (4.2) fails to hold, but $v_2 - c_2 > r_B + r_S$ the parties renegotiate. In this case B offers S a price $p = c_2 + r_S$, S feels entitled to $v_2 - r_B$, and S shades by $\theta(v_2 - c_2 - r_B - r_S)$. An optimal contract solves:

[21] Our explanation of the shift to flexible employment should be distinguished from a related one based on the idea that fairness norms dictate that workers within a firm cannot be treated very differently, while such norms do not apply across firms. Then a period of increasing dispersion in productivity might lead firms to outsource lower-wage work. See, e.g.,Weil (2014). We see this explanation as complementary to the one provided here. In future work it would be interesting to incorporate several workers (sellers) into our analysis.

[22] Another way to think of a renewable contract is that, concerning the second period, it is an "agreement to agree". If the second period price equals the first period price a renewable contract can also be interpreted as an evergreen contract.

(4.3) $Max\ (v_1 - p_1) + \int_{v_2-\pi \geq r_B, \pi - c_2 \geq r_S} (v_2 - \pi)\, dF$

$$+ \int_{v_2-c_2>r_B+r_S, v_2-\pi<r_B \text{ or } \pi-c_2<r_S} [v_2 - c_2 - r_S - \theta(v_2 - c_2 - r_B - r_S)] dF + \int_{v_2-c_2<r_B+r_S} r_B dF$$

S.T.

(4.4) $(p_1 - c_1) + \int_{v_2-\pi \geq r_B, \pi-c_2 \geq r_S} (\pi - c_2) dF + \int_{v_2-\pi<r_B \text{ or } \pi-c_2<r_S} r_S dF \geq \overline{u}.$

Since (4.3) is decreasing in p_1, (4.4) will be binding at the optimum. Thus we can write the parties' payoffs as

(4.5) $U_B^R = (v_1 - c_1) + \int (r_B + r_S) dF + \int_{v_2-\pi \geq r_B, \pi-c_2 \geq r_S} (v_2 - c_2 - r_B - r_S)\, dF +$
$\int_{v_2-c_2>r_B+r_S, v_2-\pi<r_B \text{ or } \pi-c_2<r_S} (1-\theta)(v_2 - c_2 - r_B - r_S) dF - \overline{u},$

$U_S^R = \overline{u}.$

Compared with a continuing contract, an indexed contract has advantages and disadvantages. The advantage is that the second period price is nailed down and so, if (4.1) – (4.2) are satisfied, trade will occur and there is nothing to argue about. In contrast, under a continuing contract, there will be argument and aggrievement if $v_2 \neq v_1$ or $c_2 \neq c_1$ and, in the case of idiosyncratic shocks, trade may not occur at all. The disadvantage of a renewable contract is that, if (4.1) or (4.2) is not satisfied, but trade is efficient, the parties will bargain over the whole gains from trade $(v_2 - c_2 - r_B - r_S)$ in renegotiation and there will be substantial shading. In contrast under a continuing contract the use of the first period contract and the market price as reference points may allow the parties to adjust to the new situation relatively easily, e.g., if idiosyncratic shocks are small and value and cost have not changed much (Proposition 4)[23].

Proposition 7 states conditions under which (4.1) – (4.2) will be satisfied when trade is efficient and an indexed contract achieves the first-best.

<u>Proposition 7</u>

Assume $\varepsilon^{max} < t, \varepsilon'^{max} < t'$. Suppose $Prob(v_2 - \pi + \varepsilon - t \geq 0 \text{ and } \pi - c_2 + \varepsilon' - t' \geq 0 |$
$v_2 - c_2 > r_B + r_S) = 1$. Then a fully indexed contract achieves the first-best.

[23] In our formulation a renewable contract is always at least as good as a short-term contract. This is because the parties can always renegotiate if (4.1) or (4.2) fails to hold, as if the renewable contract never existed. This may be too optimistic. In some cases renegotiation of a renewable contract may be seen as opportunistic and the parties may simply walk away. A short-term contract can then be better than a renewable contract.

Proof:

Since $\varepsilon^{max} < t$, $\varepsilon'^{max} < t'$, $v_2 - \pi + \varepsilon - t \geq 0$, $\pi - c_2 + \varepsilon' - t' \geq 0$ imply $v_2 - r_B > \pi > c_2 + r_S$. Hence trade takes place without renegotiation when it is efficient. On the other hand, the parties walk away when trade is inefficient. Q.E.D.

Proposition 7 tells us that full indexation works well when idiosyncratic shocks are small and, conditional on trade being efficient, $v_2 - \pi + \varepsilon - t \geq 0$ and $\pi - c_2 + \varepsilon' - t' \geq 0$, that is, both parties find it profitable to access the outside market. The latter conditions can be described as "the outside market is relevant". In contrast, if $v_2 - \pi + \varepsilon - t < 0$ or $\pi - c_2 + \varepsilon' - t' < 0$ or both, the outside market is irrelevant for at least one of the parties — it may even be the "wrong" market. In this case the market price π is unlikely to be a good guide as to what should happen inside the relationship, and one would not expect indexation to work well.

If we compare Propositions 4 and 7 and focus on the case where idiosyncratic shocks are small, we see that continuing contracts work well if, conditional on trade being efficient, business is as usual, while fully indexed contracts work well if, conditional on trade being efficient, the outside market is relevant. Neither set of conditions subsumes the other. Value and cost may not change much and yet the market may be irrelevant (in which case a continuing contract is good); and the outside market may be relevant and value and cost may change significantly (in which case a fully indexed contract is good).

In the case where the outside market is always irrelevant for both parties, that is, $v_2 - \pi + \varepsilon - t < 0$ and $\pi - c_2 + \varepsilon' - t' < 0$ with probability 1, a non-indexed renewable contract that sets p_2 equal to a constant may be better than a fully indexed contract. This is in effect the case studied in Hart and Moore (2008), where there is no outside market[24]. As an example, if v_2 is a constant but c_2 varies, a contract that specifies $p_2 = v_2$ achieves the first-best. Similarly, if c_2 is a constant but v_2 varies, a contract that specifies $p_2 = c_2$ achieves the first-best. Finally, if the market is relevant for one party but not for the other, a fully indexed contract may cause the party for whom the market is irrelevant to quit, but a non-indexed contract may cause the party for whom the market is relevant to quit.

Of course, given that the environment is stochastic, the market may be relevant (for both parties) in some states and irrelevant (for both parties) in others. In this case an indexed contract will work well in the former but badly in the latter, and vice versa for a non-indexed renewable contract. In contrast, under the business as usual condition (and still assuming small idiosyncratic shocks), a continuing contract will achieve the first-best.

The case where a continuing contract is superior to an indexed contract can be interpreted as one where "less is more": it is better to say nothing about the second period price than to say something. This idea is explored at greater length in Halonen-Akatwijuka and Hart (2013).

[24] Hart and Moore (2008) allow for a contract that specifies a price range rather than a single price at date 1.

5. Alternative entitlements

We have assumed an extreme self-serving bias such that each party feels entitled to any favorable change and thinks that the other party should bear the full cost of any unfavorable change. Here we discuss alternative assumptions about entitlements and argue that our main results are robust to these alternatives.

First, we consider less extreme self-serving biases. Define B's and S's reasonable prices $\underline{p}$ and $\overline{p}$, instead of (2.12) and (2.14), by

(5.1) $\underline{p} = p_1 + f^B(\Delta v, \Delta c)$,

(5.2) $\overline{p} = p_1 + f^S(\Delta v, \Delta c)$,

where $\Delta v = (v_2 - v_1)$ and $\Delta c = (c_2 - c_1)$. Suppose the parties may attribute some of the favorable changes to the other party and bear some of the consequences of unfavorable changes. However, at least a degree of self-serving bias remains. To be more precise, assume

(5.3) $0 \le \left.\frac{\partial f^B}{\partial \Delta v}\right|_{\Delta v>0} < \left.\frac{\partial f^S}{\partial \Delta v}\right|_{\Delta v>0} \le 1,\ 0 \le \left.\frac{\partial f^S}{\partial \Delta v}\right|_{\Delta v<0} < \left.\frac{\partial f^B}{\partial \Delta v}\right|_{\Delta v<0} \le 1$,

(5.4) $0 \le \left.\frac{\partial f^S}{\partial \Delta c}\right|_{\Delta c<0} < \left.\frac{\partial f^B}{\partial \Delta c}\right|_{\Delta c<0} \le 1$ and $0 \le \left.\frac{\partial f^B}{\partial \Delta c}\right|_{\Delta c>0} < \left.\frac{\partial f^S}{\partial \Delta c}\right|_{\Delta c>0} \le 1$.

Note that this formulation covers cases where one or both parties finds it reasonable to raise price if the seller's cost increases but not if the buyer's value increases (as suggested by Okun (1981)). Under (5.3)-(5.4), price adjustment under a continuing contract is costly in general. Suppose furthermore that the reasonable prices can differ from p_1 only if either value or cost changes, that is $f^i(0,0) = 0$ for $i = B, S$. Then there is nothing to argue about when business is as usual, $\Delta v = \Delta c = 0$, and Propositions 2, 4 and 6 will hold.

A less extreme self-serving bias can also affect entitlements when renegotiating a short-term contract. However, the parties are still bargaining over the whole surplus under a short-term contract and only over the change in surplus under a continuing contract. Therefore Propositions 1 and 3 will continue to hold. Similarly, Proposition 5 holds.

Second, we have assumed that the reasonable price depends only on factors internal to the relationship but not on the market price — unless it becomes necessary to adjust the price to stop a party quitting. As an alternative let us explore reasonable prices that are a combination of internal and external factors but maintain the extreme self-serving bias for simplicity[25]. Change (2.12) and (2.14) to

[25] In Akerlof and Yellen (1990) the fair wage is assumed to be a weighted average of internal factors and market-clearing wages.

(5.3) $\underline{p} = p_1 + Min(v_2 - v_1, 0) + Min(c_2 - c_1, 0) + Min(\pi_2 - \pi_1, 0),$

(5.4) $\overline{p} = p_1 + Max(v_2 - v_1, 0) + Max(c_2 - c_1, 0) + Max(\pi_2 - \pi_1, 0),$

where π_1 represents the first period market price and π_2 the second period market price. Now if the definition of "business as usual" includes not only the internal factors, $\Delta v = \Delta c = 0$, but also the external factors, $\Delta \pi = 0$, then the parties agree on the price and Propositions 2, 4 and 6 remain true.

Renegotiation surplus under a short-term contract does not depend on π while a large $|\Delta \pi|$ increases $\left(\overline{p} - \underline{p}\right)$ under a continuing contract. However, after taking into account the break-even conditions, it still remains true that $\overline{p}' - \underline{p}' \leq v_2 - c_2$ (with zero outside options — and similarly with positive outside options). Therefore Propositions 1 and 3 are robust to allowing the reasonable prices to depend on the market price. Similarly, Proposition 5 will hold.

We should add one qualification. We have supposed that in a short-term contract each party feels entitled to 100% of the surplus. However, it is possible that entitlements are less extreme. Under these conditions, Halonen-Akatwijuka and Hart (2013) argue in a somewhat different context that a contract where parties use multiple reference points (here a continuing contract) may perform worse than a contract that uses no reference points at all (here a short-term contract) because the parties may disagree about how to weight the different reference points. A similar phenomenon might arise here.

6. Conclusions

In this paper, we have taken some first steps towards analyzing continuing relationships and contracts, which we define to be situations where parties use previous contractual terms, possibly in combination with market prices, as reference points when they revise their contract. We have argued that a continuing contract can be a useful alternative to a long-term contract or an explicitly short-term contract when there is uncertainty about the efficiency of future trade. A continuing contract makes it easier than a short-term contract to negotiate future trade when this is efficient since there is less to argue about; while the parties can leave the relationship more easily when trade is inefficient than in the case of a long-term contract. A continuing contract works particularly well when the shocks hitting the parties' payoffs are common rather than idiosyncratic and either business remains as usual or a big change occurs that makes it desirable for the relationship to break up.

Continuing contracts work less well when shocks are idiosyncratic, given that adjustments in the trading price unsupported by changes in value and cost inside the relationship or by changes in market price may be seen as opportunistic and to violate fair bargaining. This assumption is consistent with the ideas and empirical work of Kahneman et al. (1986), Okun (1981), Blinder et al. (1998) and Bewley (1999). One way to improve on continuing contracts in the presence of idiosyncratic shocks is to introduce some stickiness in the quitting process. We have argued that an employment contract does just that. As several have noted, employment comes with an implicit promise of a long-term relationship, even if the contract is formally "at-will" (see Osterman (1988), Belous (1989) and Davis-Blake and Uzzi (1993)). We have modelled this (extremely) by supposing that in an employment contract neither party can quit to take a positive outside option without the permission of the other. We have shown that an employment contract works well if either business is as usual or a big change occurs so that the gains from trade vanish both inside and outside the relationship. Our theory can throw light on the trade-off between employment and independent contracting, and provides a possible explanation for the recent shift to flexible employment arrangements in the U.S. and other countries, based on an increased value of flexibility.

To the extent that the market price is observable to the parties, it is also quite likely to be verifiable. It is natural therefore to consider indexed contracts. We have shown that a contract that indexes future prices to the market price works well to the extent that the market price tracks what goes on both inside and outside the relationship: if parties are willing to trade at the indexed price future bargaining is avoided altogether. However, if the indexed price falls outside the region where both parties want to trade, and yet trade is efficient, the indexed contract will have to be renegotiated, which is costly. We show that, if idiosyncratic shocks are small and, conditional on trade being efficient, the outside market is viable ("relevant") for both parties, an indexed contract performs well, but otherwise a continuing contract that leaves future terms open can be superior.

We close by noting two extensions of our analysis. First, although we have modelled an outside market in the second period, the market price is exogenous. It would be interesting to consider a situation where there are many buyers and sellers at both dates 0 and 1 and the contract terms at date 0 and the market price at date 1 are determined as part of a general equilibrium.

Second, we have taken what constitutes fair bargaining as given. But an obvious question to ask is, where does the notion of fairness come from? And could it be altered? Might the parties, possibly by communication at date 0, find a way to incorporate idiosyncratic shocks "fairly" in future bargaining so as to increase efficiency? These are deep and fascinating questions for future research.

REFERENCES

Abraham, Katherine B. and Susan K Taylor. 1996. “Firms’ Use of Outside Contractors: Theory and Evidence.” Journal of Labor Economics 14 (3): 394-424.

Akerlof, George A. 1982. “Labor Contracts as Partial Gift Exchange.” Quarterly Journal of Economics 97 (4): 543-569.

Akerlof, George A. and Janet L. Yellen. 1990. “The Fair Wage-Effort Hypothesis and Unemployment.” Quarterly Journal of Economics 105 (2): 255-283.

Autor, David. 2003. “Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing.” Journal of Labor Economics 21 (1): 1-42.

Bar-Gill, Oren and Omri Ben-Shahar. 2003. "Threatening an Irrational Breach of Contract." 11 Supreme Court Economic Review 143.

Benjamin, Daniel J. 2015. “A Theory of Fairness in Labor Markets.” Japanese Economic Review 66 (2): 182-225.

Belous, Richard S. 1989. *The Contingent Economy: The Growth of the Temporary, Part-time, and Subcontracted Workforce.* Washington, DC: National Planning Association.

Bewley, Truman F. 1999. *Why Wages Don’t Fall during a Recession*. Harvard University Press.

Blinder, Alan, Elie R.D. Canetti, David E. Lebow and Jeremy B. Rudd. 1998. *Asking About Prices: A New Approach to Understanding Price Stickiness.* Russell Sage Foundation.

Che, Yeon-Koo and Donald B. Hausch. 1999. “Cooperative Investments and the Value of Contracting.” American Economic Review 89 (1): 125-147.

Davis-Blake, Alison and Brian Uzzi. 1993. “Determinants of Employment Externalization: A Study of Temporary Workers and Independent Contractors.” Administrative Science Quarterly 38 (2): 195-223.

Diamond, Douglas W. 1991. **"**Debt Maturity Structure and Liquidity Risk**."** Quarterly Journal of Economics 106 (3): 709-37.

Dye, Ronald A. 1985. “Optimal Length of Labor Contracts.” International Economic Review 26 (1): 251-270.

Fehr, Ernst, Oliver Hart and Christian Zehnder. 2011. “Contracts as Reference Points – Experimental Evidence.” American Economic Review 101 (2): 493-525.

Fehr, Ernst, Oliver Hart and Christian Zehnder. 2015. “How Do Informal Agreements and Revision Shape Contractual Reference Points?” Journal of the European Economic Association 13 (1): 1-28.

Gray, Jo Anna. 1978. “On Indexation and Contract Length.” Journal of Political Economy 86 (1): 1-18.

Guriev, Sergei and Dmitriy Kvasov. 2005. "Contracting on Time." American Economic Review 95 (5): 1369-1385.

Halonen-Akatwijuka, Maija and Oliver Hart. 2013. “More is Less: Why Parties May Deliberately Write Incomplete Contracts.” NBER Working Paper No. 19001.

Halonen-Akatwijuka, Maija and Oliver Hart. 2015. “Short-term, Long-term, and Continuing Contracts.” NBER Working Paper No. 21005.

Harris, Milton and Bengt Holmstrom. 1987. “On the Duration of Agreements.” International Economic Review 28 (2): 389-406.

Hart, Oliver and John Moore. 2008. “Contracts as Reference Points.” Quarterly Journal of Economics 123 (1): 1-48.

Iyer, Rajkamal and Antoinette Schoar. 2015. “Ex Post (In) Efficient Negotiation and Breakdown of Trade.” American Economic Review 105 (5): 291-94.

Kahneman, Daniel, Jack L. Knetsch and Richard Thaler. 1986. “Fairness as a Constraint on Profit Seeking: Entitlements in the Market.” American Economic Review 76 (4): 728-741.

Katz, Lawrence and Alan Krueger. 2017. “The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015.” Harvard University, mimeo.

Levine, David I. 1991. “Just-Cause Employment Policies in the Presence of Worker Adverse Selection.” Journal of Labor Economics 9 (3): 294-305.

MacLeod, W. Bentley and James M. Malcomson. 1993. “Investments, Holdup, and the Form of Market Contracts.” American Economic Review 83 (4): 811-837.

Maskin, Eric and Jean Tirole. 1999. “Unforeseen Contingencies and Incomplete Contracts.” Review of Economic Studies 66 (1): 83-114.

Okun, Arthur M. 1981. *Prices and Quantities: A Macroeconomic Analysis.* The Brookings Institution.

Osterman, Paul. 1988. *Employment Futures: Reorganizations, Dislocations, and Public Policy.* Oxford University Press.

Oyer, Paul. 2004. “Why Do Firms Use Incentives That Have No Incentive Effects?” Journal of Finance 59 (4): 1619-1649.

Rotemberg, Julio J. 2011. “Fair Pricing.” Journal of the European Economic Association 9 (5): 952-981.

Segal, Ilya. 1999. “Complexity and Renegotiation: A Foundation for Incomplete Contracts.” Review of Economic Studies 66 (1): 57-82.

Weil, David. 2014. *The Fissured Workplace: Why Work Became So Bad for So Many and What Can Be Done to Improve It.* Harvard University Press.

Weitzman, Martín L. 1984. *The Share Economy: Conquering Stagflation.* Harvard University Press.

Williamson, Oliver E. 1985. *The Economic Institutions of Capitalism*. The Free Press.