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Asymmetric Power and Market Failure:

Power Hazard in Exchange

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Asymmetric Power and Rent Seeking: Power Hazard in Market Exchange

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Abstract

In simple textbook treatment of bilateral exchange traders end up on the *contract curve* such that the trading surplus is maximized regardless of any asymmetric bargaining power they might have. However, that need not be true when the terms of exchange are determined by uncooperative bargaining, for gains from trading will not reach its potential unless traders refrain from acting strategically. But, because power asymmetry creates quasi-rents that the more powerful player can capture, she might maximize her payoff when total gain from trading falls short of its potential. In other words, power asymmetry can make acting strategically tempting for the more powerful player, which however is socially costly. Using game theory the paper specifies profit maximizing strategic behavior under asymmetric power and considers its relevance for a more general conception of market exchange where traders bargain strategically. Two examples, involuntary unemployment and North's theory of the state, are then discussed in light of the model developed.

Keywords: Asymmetric Power, Rent Seeking, Uncooperative Games, Strategic Bargaining
JEL Classification: A10, D70, C70, E02

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Introduction

Consider an unskilled, undocumented migrant laborer who is cheated of his daily wages by her employer. Stuck on the long side of the market, what is her rational course of action if seeking redress through the legal system is not realistic for the obvious reasons? The benefit she draws from exchange depends on her ability to project a perceived capability to retaliate that is credible enough to lower her employer's expected gain from reneging *ex-post* on her *ex-ante* promises – that is, if she is so inclined to cheat. There is of course the other side of the trade as well, as the employer might get less than she had bargained for if the laborer shirks after being employed. The challenge faced by the employer is the well-known *agency* problem, while that of the worker is how to redress the power imbalance so that her employer is not tempted to take advantage of her weakness. Gains from trading require that both sides successfully deal with their respective challenge. The powerful agent needs to deal successfully with agency issues, and the weaker side with power balancing. Failure at either can undermine gains from trading. The agency problem is well-known in its various manifestations, but the same cannot be said for the complications that can arise from low bargaining power. Yet, failure at power balancing can undermine gains from exchange and even threaten its viability, which is the focus of this paper.

Economics textbooks often start out conceptualizing bilateral exchange with the time honored *Edgeworth Box*, where asymmetric bargaining power has no impact on the size of the gain itself even if the trading surplus is shared unequally. Whatever the exact outcome of their bargain the traders are assumed to end up on the *contract curve* such that the trading surplus is maximized. The Coase Theorem is based on a similar premise as well. In the absence of transaction costs it is thought that agents would strike a bargain that would maximize the trading surplus regardless of how property rights are assigned between them and the resulting differences in bargaining power.

That however need not be true when agents bargain strategically. Simple game theory can help us sum up why in three propositions: (i) gains from trading require that traders *cooperate* in the sense of refraining from *opportunistic* defection; (ii) power asymmetry can crate quasi rents that make opportunistic defection tempting for the more powerful player; and, (iii) traders' joint payoff, i.e., total gain from trading can fall short of its potential when the powerful player maximizes her payoff through defection.

Think of market exchange as a Prisoner's Dilemma (PD) game (Hardin 1982, 1995, Ch. 2; Knight 1992; Congleton 1980). Both sides are better off when they exchange. But, the seller is better off yet if she could keep her ware after being paid, though the buyer would be worse than not trading at all. In a similar manner, the seller is worse off than not trading if the buyer could get what she wanted without paying. In the familiar PD payoff matrix these are the off-diagonal transactions that are commonly thought irrelevant in market exchange. When potential for a mutually beneficial exchange exists, we generally assume the trade either takes place or not. Both agents benefit when it does and lose out when it is foregone - the diagonal transactions, *win-win* or *lose-lose* are thus assumed the only relevant possibilities**.** However, it is not hard to think of exceptions.

For instance, the use of credit creates a potential for an off-diagonal transaction. Since the delivery of goods and payment are not simultaneous the buyer can potentially renege on his promise to pay after getting the goods. Greif (1994) calls this the "fundamental problem of exchange," for unless some *institutional framework* enables a buyer on credit to commit *ex-ante* to not renege *ex-post* the credit will not to be extended and the potentially mutually beneficial transaction will be foregone. The problem of *holdup* or *opportunistic defection* in Williamson (1985, 2005) is in principle the same. Just like in the credit example, the payoff of an agent from a *transaction specific* investment depends on whether her counterparty defects midstream. In both examples, the first mover sees a wedge open up between her preferred first and fall back second best option after initiating the exchange, since she either walks away making a loss or is forced to accept a smaller share of the surplus if her counterparty decides to renegotiate midstream.

In these examples, what makes opportunistic behavior possible is the emergence of *asymmetric power* to adversely influence the other's payoff through defection during the course of the exchange. But, asymmetry in bargaining power can exist from the outset as well. All it requires is that one side needs or wants the transaction more than the other, which in general results from the discrepancy in the relative worth of the respective traders' second best option in relation to their first, i.e., when one side's second best option is almost as attractive as her first while the other's second best is much inferior.[1] Of course, the very point of *contracting* is to check the potential for opportunistic defection, but the contract will not be self-enforcing when defection is preferable to cooperation. With *incomplete contracts* and costly enforcement asymmetric power can remain a problem whenever cooperation fails to trump opportunistic defection.

We know well how cooperation can emerge in repeated PD. Defection yields an initial windfall gain, but can also entail future (reputation) costs that can work as a deterrent when the latter is expected to exceed the former. For instance, at the simplest level, the future costs of defection can take the form of a trading partner retaliating by withholding cooperation in successive play.[2] Yet, the threshold of expected future cost that can deter defection would differ across traders with asymmetric power. Someone who has a second best alternative that is almost as attractive is harder to deter.[3] Such a player can defect repeatedly in successive play as well if the other player's second best alternative is even worse than the *sucker's* payoff. Thus, one side can get the *temptation* payoff and the other the *sucker's* payoff continuously. Technically, this turns PD into a *Chicken* game, where unequal exchange at either off-diagonal (depending on whether the Row or the Column is the high power player) becomes a Nash equilibrium. It can be expected to persist in repeated encounters as long the powerful player finds defection preferable to cooperation, but that can also prevent joint gains from trading being realized in full.

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[1] This draws from Emerson's (1962) classic, dyadic relational definition of power. In part based on his work, the modern *network exchange theory* defines inter-agent power asymmetry in terms of the uneven distribution of exchange opportunities (Cook et al 1983; Cook & Yamagishi 1992). For other discussion of asymmetric power and power balancing that also use game theory, see Bowles (2004, Chp. 5), Ferguson (2013), Knight (1992), Elster (1989, Chp 2), and Bates (1983, 2001), among others.

[2] For a broader discussion on how cooperation can arise, see Kreps (1990), Nowak (2006), and Bowles (2013) on the much neglected importance of group selection.

[3] The actual calculus can be complicated as for instance the defector might have to weigh in not just bilateral but also multilateral future sanctions against defection, but the gist of the idea remains the same.

The rest of the discussion is organized as follows. Section I below uses a dyadic PD *cum* Chicken *supergame* to show how asymmetric power can result in welfare loss. Section II extends the game to specify the equilibrium of the powerful player. Section III applies this extended model to two examples of asymmetric power: North's theory of the state and involuntary unemployment. A brief conclusion ends the paper.

I. Asymmetric Power and Exchange

In perfectly competitive general equilibrium no agent enjoys greater bargaining power than anyone else no matter how unequally distributed might be their endowments, social status or political power because everyone's second best alternative is almost as good as their most preferred position. Moreover, no agent can act strategically as everyone is a price-taker. The infinitesimally small sellers (buyers) selling to (buying from) the market face an infinitely elastic demand (supply) schedule and receive the producer's (consumer's) surplus in full.

But, whenever the terms of exchange is determined by *bargaining* the gain from trading is up for grabs. In behavior outside equilibrium or, more broadly, when strategic behavior is rewarding asymmetric power matters and the off-diagonal PD transactions of the type discussed above become relevant. The Walrasian insight that in every market that does not clear a potential exists for mutually beneficial trades exists can still hold, but agents fail to exploit them not due to some extrinsic market imperfection but on account of potential problems stemming from information asymmetries and difficulties of collective action. These in turn might be intrinsic to the way particular markets function given the nature of enforcement institutions that exist. In what is to follow, I abstract from all else to focus on the effect asymmetric power can have on the strategic interaction between traders. I further narrow my scope by assuming that strategic behavior takes the form of trying to shift the fixed costs of market exchange onto the other.

One way of conceptualizing the bargaining process over terms of exchange is in terms of focusing on who bears the costs of market exchange. This is reminiscent of Flood's (1952, 1958) original formulation of PD, where the focus is explicitly on the economy on (collective) transaction costs of market exchange cooperation affords. Recall that in this early version, the question is the way the two friends who are transacting on an old used car would split the difference between the car dealer's buying and selling price by bypassing the dealer. Thus, the basic idea is that when traders can trust each other, or more generally cooperate, the market-making and enforcement costs of exchange are lower and higher when they fail to cooperate.

Below, I represent the exchange among traders who are assumed to interact repeatedly as an indefinitely repeated dyadic PD/Chicken *supergame*, where their exchange is less costly when they cooperate. That is, the magnitude of collective costs is lower when players amicably share the burden than when they try to shift it onto the other. Thus, cooperation involves some equitable sharing of these costs[4] and raises players' respective payoff in two ways; one, by reducing total collective costs of exchange, and, two, by making the exchange more lucrative for both traders individually.

Consider the following familiar payoff matrix:

	Cooperate	Defect
Cooperate	$\lambda - a\gamma, \lambda - a\gamma$	k, e
Defect	e, k	$\Theta - \gamma, \Theta - \gamma$

Where first entry in each cell gives Row's payoff and the second the Column's, and where

λ – reward for cooperation

e – temptation payoff

k - suckers' payoff

Θ – punishment payoff

γ - half of collective costs

[4] For simplicity, I will assume that to be an equal distribution.

When players try to shift a higher burden onto the other but end up with an equal burden because of power symmetry each players' payoff is lowered by γ. That is, in the absence of cooperation and equal sharing of the burden of collective costs their respective payoff is $(\Theta - \gamma)$, and when they manage to cooperate the collective costs are lowered by the fraction $(1-a)$ where a $(0 < a < 1)$ gives the fraction of collective costs cooperation cannot eradicate.

Put differently, the Pareto improvement caused by cooperation (m) is assumed to have two sources; one is the economy on collective costs (z), and the other is the increment in private return caused by cooperation (r).

$$m = \lambda - a\gamma - (\Theta - \gamma) = (\lambda - \Theta) + (1 - a)\gamma = r + z$$

$$r = \lambda - \Theta > 0$$

and,

$$z = (1-a)\gamma$$

Asymmetric power enables the powerful player to shift some or all the burden of collective costs onto the less powerful player. In the limit, when the *weak* player ends up bearing all collective costs, the *temptation* and *sucker* payoffs become, respectively:

$$e = \Theta$$

$$k = \Theta - 2\gamma$$

Cost shifting involves a zero-sum change - whatever the powerful player gains the powerless loses:

$$\Theta - \gamma = (e + k)/2$$

We can also introduce a coefficient of asymmetric power (b) in the respective payoffs, $0 < b < 1$. The total collective costs shifted on to the powerless player are then given by $b\gamma$ – hereafter, termed the level of *uneven burden* and denoted x $(= b\gamma)$. The variable x reaches its maximum when b is equal to unity and is nil when b is zero. For any value in between the *temptation* and *sucker* payoffs are:

$$e = \Theta - (1 - b)\gamma$$
$$k = \Theta - (1 + b)\gamma$$

The powerless agent does not walk away as long as k remains higher than her second best option. Thus, the powerful player can keep receiving the temptation payoff in successive play, and will not cooperate unless its reward exceeds the *temptation* payoff. This means that the condition for cooperation becomes:

$$\lambda - a\gamma > \Theta - (1 + b)\gamma$$

which can be rearranged into:

$$m > x \qquad \text{or} \qquad r > x - z.$$

Thus, given its *reward*, cooperation is less likely the greater the level of asymmetric power. And, with a given *uneven burden*, the higher is cooperation's reward the greater its potential to lower collective costs or raise private payoffs. Thus, holding r and z constant, a threshold level of asymmetric power exists beyond which the powerful agent would rather defect than cooperate, and that in turn causes the players' joint payoff to fall short of its maximum. Past this threshold the high power player's equilibrium depends mainly on the opportunity cost of the low power player. The low power player's ability to walk away, and how costly that is for the powerful player constrains the temptation payoff as shown in the next section.

II. The Powerful Player’s Equilibrium

It is possible that the opportunity cost of the low power player, i.e., her second best option, changes over time. In any ongoing relationship the party whose relative benefit from it is lower than her counterparty’s might be induced, it is reasonable to think, to search harder for a better alternative, and whenever one is found terminate the relationship. The higher the likelihood of this search effort being fruitful, the low power agent can do a better job in ‘power balancing’. Intuitively, it follows that the unevenness of the burden between the players will be less when the low power player can credibly threaten to walk away – all the more so, the costlier that is for the former. To model this, three changes are introduced in the *temptation* and *sucker’s* payoffs discussed above. These involve a (i) variable trading time, (ii) making cost shifting negative sum, and (iii) considering explicitly the opportunity cost of the low power player. With these changes, the temptation and sucker’s payoff take the form,

$$e(t) = \varphi t + c[x, t(x)]xt$$
$$k(t) = (\varphi - x)t - s(t)$$

First change involves introducing trading time t, which is defined as the number of times the game is played. In the absence of cost shifting both players draw a benefit equal to $\varphi = \Theta - \gamma$ per play as assumed before, and receive φt over the length of their total trading. The level of uneven burden borne by the weaker player in one play is again x, and thus xt is the total costs shifted onto the low power player.

The second change makes cost shifting *negative-sum*, which results from the low power player resisting cost shifting and the high power trying to overcome this resistance. The powerful player’s marginal gain from shifting costs falls short of the powerless player’s marginal loss. In other words, the powerful player’ total gain from cost shifting is now assumed given by cxt, where c - the benefit the powerful player draws on the margin for each additional unit of cost shifted onto the low power player – is normally less than one. Starting from unity, it falls with a higher uneven burden because that makes the low power player walk away sooner or become recalcitrant, both of which can be costly to the high power player. That is, c is assumed to (i) increase with the length of trading t, $(c_t > 0)$, and, (ii) decrease with cost shifting because it reduces trading time, $t_x < 0$, and intensify bargaining and contention $(c_x < 0)$.

Given that an increase in cost shifting raises the temptation payoff by less than it reduces the sucker's payoff, the powerful player's marginal benefit from cost shifting diminishes and becomes nil at the point where her payoff is maximized, satisfying the condition, $\frac{de}{dx} = 0$, which yields:

$$c_{max} = -(c_x + c_t t_x)x$$

where c_{max} is equal to unity or some exogenously given initial value. Figure 2 depicts the *cost shifting* line, the intersection of which with unity gives the optimal level of burden shifting for the high power player for some arbitrary set of values for c_x and c_t, and t_x, where the first two coefficients are assumed exogenously given and t_x is derived from the maximizing decisions of the low power player, discussed next.[5]

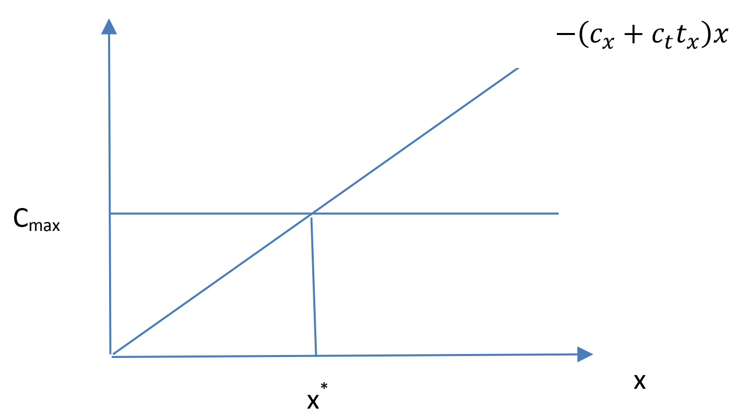

Figure 2

The third change involves modeling the low power player's ability to *walk away* by introducing an opportunity cost function in the *sucker's* payoff. Economists think axiomatically that when someone walks away from a long running trading relationship it must be because the

[5] A linear relationship is assumed throughout for simplicity.

marginal cost of staying on it exceeds its marginal benefit. This also suggests that prior to termination the marginal (opportunity) cost of trading was lower than its marginal benefit, with the implication that during trading the former must have increased more than the latter since otherwise trading would have continued. A simple way to model job termination would then be to assume that the marginal opportunity cost is a monotonically increasing function of time, $s'(t) > 0$, while marginal benefit remains constant. Trading continues as long as the latter remains higher than the former and is terminated at the point where the two become equal.

For instance, when uneven burden rises it reduces the marginal benefit of trading for the low-power player (causing $\varphi - x$ to shift down in Figure 2a), lowering the length of trading time from t_0 to t_1. Varying x yields the $\frac{dk}{dt} = 0$ isocline in the t – x space in Figure 2b. The value of t_x (and thus the slope of *cost shifting* line in Figure 2) varies directly with the slope of this isocline.

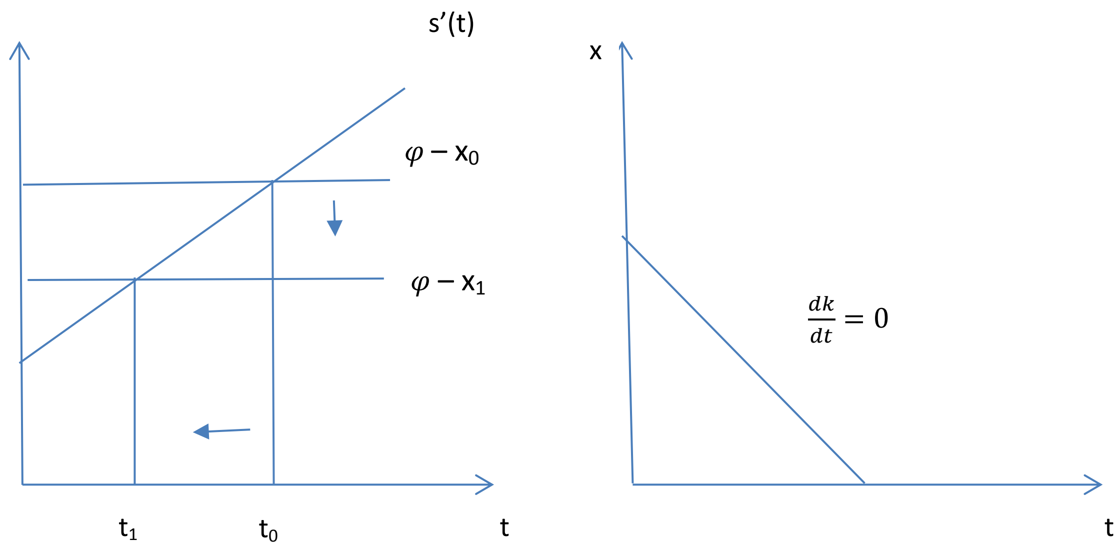

Figure 2a

Figure 2b

This extended system can be used to discuss what happens when the likelihood of finding a comparable trading relationship changes for the players when for instances market conditions are altered. Any adverse change that reduces the low power player's bargaining power implies that her marginal opportunity cost of trading will rise more slowly than before. That is, all else being the same, the $s'(t)$ schedule tilts down (Figure 3a) and that flattens the $\frac{dk}{dt} = 0$ isocline (3b) which in turn lowers the slope of the *cost shifting* line (3c) increasing the length of trading with the result that the high power player can benefit from shifting on a higher burden. If the same market changes end up lowering the low power player's level of resistance to the unequal distribution of gains from exchange (c_x ↓), and reducing the relative worth of a longer trading relationship for the high power player by lowering the cost of finding a comparable trading partner (c_t ↓), the magnitude of costs shifted in equilibrium will be higher. The combined effect of these forces is to tilt down the *cost shifting* line in Figure 3c, causing a higher level of uneven burden.

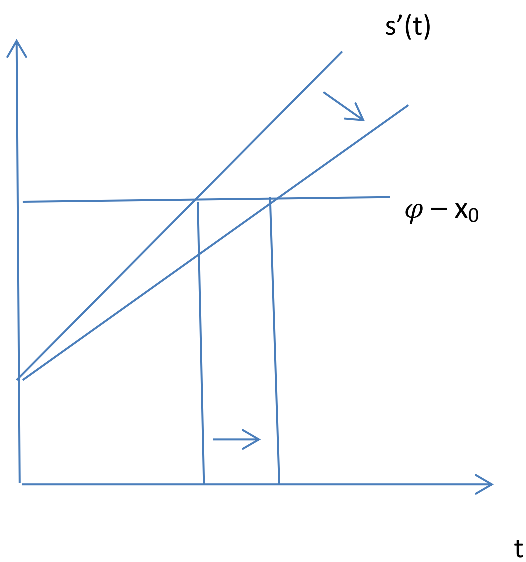

Figure 3a

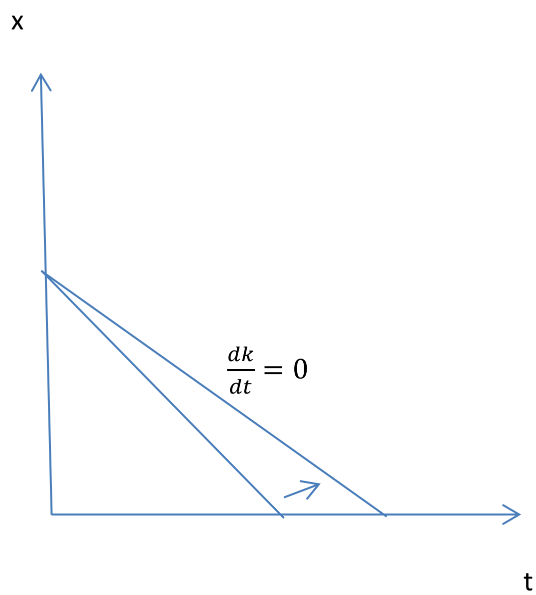

Figure 3b

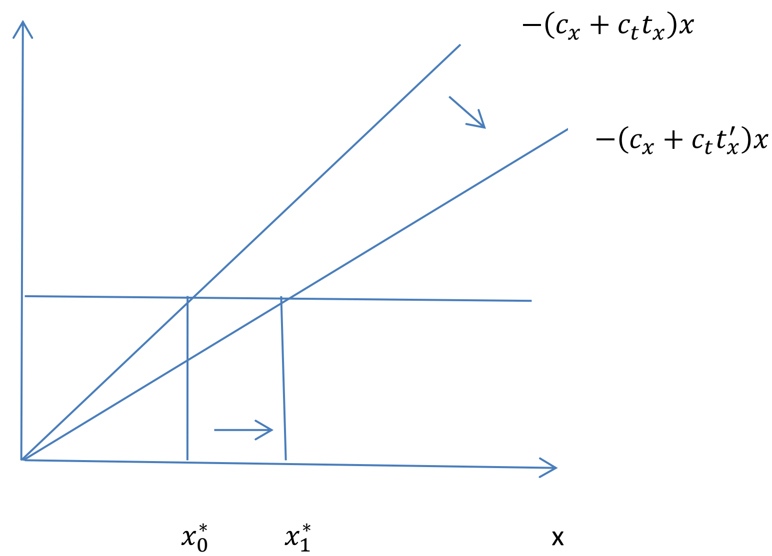

Figure 3c

Note that the more unevenly shared the burden of collective cost the higher is the magnitude of social (welfare) loss. Power asymmetry creates a quasi-rent which the maximizing agent has an incentive to grab, resulting in a deadweight loss that is not in principle any different than the adverse effect of rent seeking. The loss results from the negative sum nature of strategic behavior, i.e., one side resisting cost shifting while the other side tries to overcome that resistance. The marginal gain of the high power player from every additional unit of burden shifted is equal to c, while the social loss on the margin is given by $(1 - c)$. The triangle ABC in Figure 4 gives the magnitude of the total social loss at the high power player's equilibrium, and is equal in size to the gain of the high power player from cost shifting, shown by the triangle 01C.

When c > ½, the marginal benefit of cost shifting for the high power player falls short of its marginal social cost. This raises the possibility of a Coasian (1960, 1991) *side-payment* that can offset or reduce social loss, but note that the remedy it offers is only partial at best. The magnitude of the recouped social loss net of high power player's foregone benefit cannot exceed the triangle, (DBC). When c < ½, side payments do not work at all because the marginal benefit of cost shifting remains higher than its marginal social cost even though it still remains below the sum of the social marginal cost plus the marginal loss of the low power player. Thus, even with Coasian side-payments, the traders' joint payoff remains below its potential when the powerful player's payoff is maximized.[6]

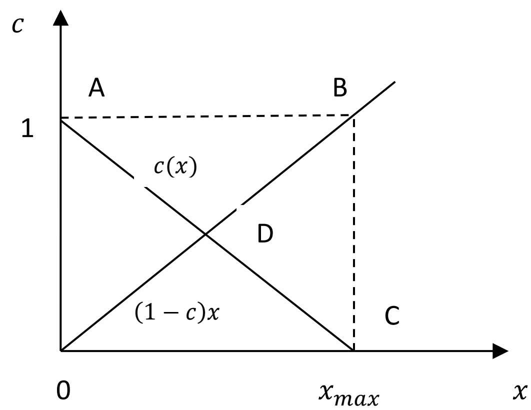

Figure 4

III. Discussion

We could imagine that our game is played by random pairs of players that are representative, respectively, of agents distinguished by their bargaining power in lopsided market situations. Whenever a non-transitory imbalance exists between supply and demand the bargaining power of those on the long side of the market falls short of those on the short side. This can entail a welfare loss if power balancing fails either because enforcement institutions are not effective or make it harder for low-power agents to *coordinate*.[7]

[6] It has been pointed out that Coase theorem does not hold if bargaining is strategic even if it is otherwise costless (Veljanovski 1982; Daly and Giertz 1975; Bromley 1978 and Regan 1972). Others have countered this criticism by arguing that Coase's definition of transaction cost includes strategic behavior in bargaining. Yet, the incentive for (and thus the cost of) acting strategically is likely to be higher when other transaction costs do not exist (Veljanovski 1982).

[7] For instance, the recent Supreme Court rulings that led to the proliferation of contracts that explicitly ban class-action suits by consumers, might have had, *ceteris paribus*, the effect of raising the *temptation* payoff of businesses. A case in point might be the recent reports that drug companies are becoming less

In general, the firms' payoff from opportunistic defection is constrained by their customers' switchover costs (given the expected utility from imperfect substitutes available), which is captured by the slope of the opportunity cost of function, $s'(t)$ in the sucker's payoff. Businesses can seek market niches - like the manufacturers of so-called specialty drugs - or engage in strategies to lower their customers' future options, while competition would tend to reduce customers' switchover costs and thus dissipate the quasi rents asymmetric power creates.[8] But, when information or collective action problems, outright restrictions on entry or a shortfall in effective demand prevent competition from closing the gap between supply and demand these rents will not dissipate. Two cases might be of particular interest given their salience in economics and real world importance. One is the power asymmetry between the ruler and the ruled in North's theory of the state and the other between capital and labor in presence of involuntary unemployment. Competition cannot be relied to bring supply and demand into balance because of monopoly in the former case and because of information or macroeconomic problems in the latter.

i. The Sovereign and the Ruled

North's (1981) theory of the state provides a well-known example of asymmetric power having potentially deleterious effects. He envisions that the ruler is a discriminating monopolist whose power is constrained by the opportunity cost of the ruled. The state serves two objectives that can potentially come into conflict. One is raising the social payoff through reducing 'transaction

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inclined to invest in drugs that are used by large number of patients who tend to have political voice and can push back on price. Investing instead in the so-called specialty drugs that are used in the treatment of uncommon illnesses by contrast gives much greater pricing power and thus profit opportunities as power asymmetry is larger (National Public Radio 2016).

[8] In Walrasian general equilibrium analysis, the equilibrating effect of market competition is not as easy to show as it is generally presumed when agents have any pricing power. The complications (*false trading*) that can arise from agent pricing power in *tatonnement* adjustment has traditionally been sidestepped by not letting any transaction take place until general equilibrium prices are arrived at. Thus, all agents are but price takers throughout the adjustment process and they are thus assumed to continue *re-contracting* (keep reporting quantities at different hypothetical prices) until the *auctioneer* churns out the equilibrium prices. At that point any asymmetric power that might have initially existed disappears. Yet, Walrasian *tattonement* with re-contracting need not be stable (Scarf 1960). Ironically, later work has showed that stability can be shown when agents exhibit pricing power in what are called *non-tatonnement* adjustment processes where agents need to be price takers. These however give rise to multiple equilibria which include sub-optimal positions (Fisher 1983).

costs' and the other maximizing its own revenue. The state can raise its own payoff at the expense of social return and its constituents by a margin determined by their second best alternative. Assuming a game that is played by the ruler and the ruled as a composite agent, Figures 3(a-c) would capture the gist of this part of the argument. Any change that lowers the bargaining power of the ruled raises the uneven burden the maximizing sovereign can impose on them, and our model highlights the failure at power balancing as the central problem. When the low power agent cannot redress the power asymmetry that reduces, not only her own, but the total gain from trading as well.[9]

In a similar manner, North (1981) suggests that what distinguishes a *predator* state that maximizes its own revenue at the social expense from a *contract* one that does not is how unevenly violence potential is distributed, i.e., the power asymmetry among the members of society. [10] But, he blames transaction costs rather than asymmetric power as the main source of the problem. A higher uneven burden imposed on the ruled distorts the incentive structure and North argues causes economic stagnation, which clearly is not in the best interest of the ruler of the state, predator or not. In other words, by imposing inefficient terms of exchange that maximizes its short run revenue the ruler ends up shooting itself on the foot. That raises the question why the ruler does not bargain for his revenue after setting efficient set of rules first, given that the context is not very different than Coase's well-known dyadic examples. The reason North argues is positive transaction costs.[11] A mutually beneficial Coasian bargain does

[9] In Grief *et al* (1994), power balancing by low power agents through coalition building makes mutually beneficial exchange possible. Long distance merchants face a sovereign who wants to attract their trade to his territory, and, thus respects their property rights and safeguard their safety initially. But, once the trade becomes well-established he is less constrained and can maraud on individual merchants with impunity. The merchants can prevent this by deterring the sovereign with a credible threat of collective boycott in the event he causes harm to any one of them. But, when their coalition and thus the credibility of their collective threat falters the sovereign can again be tempted to take advantage of their weakness. According to Acemoglu (2003) and Acemoglu & Robinson (2005) the rise of democracy can be traced to ruling elite's recognition that making a credible commitment not to violate the property rights of their people is in their self-interest. Though it is not particularly highlighted, asymmetric power and power balancing appear central to the argument in Acemoglu, Johnson & Robinson (2001, 2004).

[10] Likewise, discussing the unequal relationship between landlords and serfs, he remarks that the power of landlords to exploit their serfs was constrained by the latter's ability to run away (North 1981, p. 129).

[11] "Under the condition of zero transaction costs, the ruler could always devise, first an efficient set of rules and then bargain for his rents, but this postulate from welfare economics simply ignores positive transaction costs, which is what the game is all about" (North 1981, ft. 12, p. 28).

not work in a positive transaction cost world because neither the sovereign can credibly commit to relinquishing power nor the ruled to sticking to their part of the bargain once the asymmetric power is no more (Acemoglu 2003).

Our discussion can help distinguish the effect of asymmetric bargaining power on enforcement costs from the more narrowly defined transaction costs such as those that emanate from agency and information problems. The effect of the latter can be brought into the picture by considering their influence on cooperation's reward, i.e., its potential to lower collective costs or raise private payoffs.

From end of Section I, recall that the payoff of cooperation exceeds that of defection when

$$m > x \qquad \text{or} \qquad r > x - z.$$

This can also be expressed graphically. Setting γ equal to unity and re-arranging the condition for cooperation can be written as:

$$b + a < 1 + r$$

For any combinations of a and b that are inside the triangle in Figure 5 cooperation holds, but at points lying outside defection gives the high power player a payoff higher than cooperation can, and the social payoff falls short of its potential.

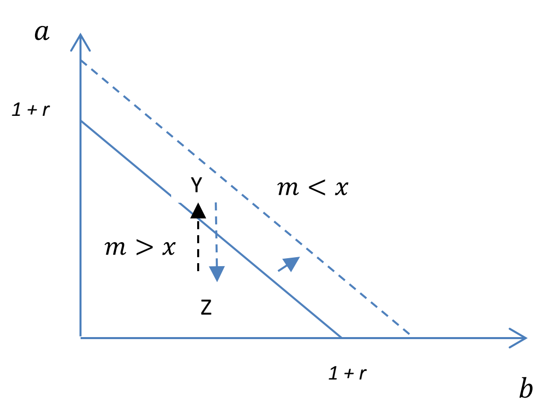

Figure 5

As North argues, levels of specialization and division of labor steadily increase with economic development, and that raises the relative importance of arms-length anonymous exchange creating new commitment problems that raise transaction costs. This can be interpreted as a rise in (a) – collective costs cooperation cannot eradicate - given the extant institutions, shown as a displacement from point Z to Y in Figure 5. Restoring the effectiveness of cooperation on collective costs requires the creation of new institutions that can function as effective commitment devices, which along with improvements in measurement technologies can also raise its positive effect on private return (r) – shown as a an upward shift in the upper bound of the *solution set* triangle in Fig 5. Holding asymmetric power (b) constant, a reduction either in a or an increase in r can thus move us back inside the *solution set* triangle, turning our PD *cum Chicken* game into an *Assurance* game.[12] Note however that a similar institutional challenge also emerges when economic growth causes increased levels of power asymmetry as experienced in the early industrialization process of many countries, which had commonly required new institutions to transform PD game structure to one of *Assurance*. In this instance, the horizontal displacement that takes us outside the *solution set* triangle is caused by rising (b) resulting from what Lewis (1954) had called the unlimited supply of labor that occurs during early industrialization. To the extent new institutions of collective bargaining and redistribution make cooperation and sustained growth possible, the return on cooperation rises – which can be a shown as an outward shift of the upper boundary of the solution set triangle in Fig 5.

ii. Oversupply of Labor

Involuntary unemployment means that what is in offer for exchange exceeds what is demanded, such that a long and a short side of the market exist. Those on the long side (workers) have a second-best option much inferior to trading (employment) than those on short-side (employers) who can pick and choose who they employ (Bowles and Gintis 1993). Information *cum* macroeconomic problems, can prevent competition from unemployed workers - and, thus, a simple price adjustment - eradicate unemployment. This can be because the

[12] Recall that in an Assurance game the reward to cooperation exceeds the temptation payoff, which in our discussion holds when $r > a\gamma$.

unemployed workers' claims that they can do as good a job as the employed for less is not credible. If keeping workers from shirking (or turnover at a low level) requires wages to remain above a certain threshold, the unemployed workers once employed for less would also shirk (or walk) and thus require a higher wage not to. At the macro level, there might be Keynesian demand problems or a structural oversupply of labor caused by offshoring of jobs and technological change as many economists today suspect might be the case.[13]

When equilibrium wage is not relevant, it is sensible to think that the wage takes the form of *enforcement rent*, i.e., its level is determined by what keeps workers on the job. Enforcement wages are determined by the maximizing decisions of employers to reduce shirking or turnover (Yellen 1984, Akerlof & Yellen 1990).[14] This implies that employers would be constrained in their efforts to benefit from workers' lower bargaining power by workers' ability to *walk away* from the job (and engage in on the job resistance) and how costly that is to them.

It is reasonable to think that workers' ability to walk away will depend first and foremost on the size of the structural gap between supply and demand. The oversupply of labor brought about by secular changes in market conditions referred to tilts the opportunity cost $s'(t)$ schedule down (Graph 3a), which in turn flattens the $\frac{dk}{dt} = 0$ isocline (3b). All else being the same, that means a lower labor turnover rate, moving inversely with lengthening of trading (employment) (t_x), and possibly a reduction in workers' on the job resistance (c_x).

The third coefficient that matters is how costly job termination (low turnover) is to employers ($c_t > 0$). All else being the same, the higher the level of unemployment the lower one would think the cost of replacing workers would be. Also important is technology and its

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[13] Many economists today fear that the market clearing real wage for certain grades of labor in advanced countries might fallen significantly short of what is needed to safeguard the bare minimum socially accepted standard of living. The ongoing threat posed to employment by offshoring (Blinder 2006, 2007), it is argued, might be compounded by a new wave of labor displacing innovations as the pace of automation accelerates (Frey & Osborne 2013; Brynjolfsson & McAfee 2011,2014; Ford 2009,2015). In the past, technological change has destroyed many jobs only to create new ones, over time more than compensating its initial negative impact. Some economists however think that this time around it might be different and foresee an impending future employment crisis (Summers 2013, Spence 2014, Thompson 2015; Sachs & Kotlikoff 2012).

[14] In the case of low skill labor with low monitoring costs, one would expect labor turnover to be a more important consideration for employers than shirking (Stiglitz 1974).

commensurate labor process. When jobs involve non-routine tasks performed by highly skilled workers, job termination is likely to be relatively costly as the cost of both finding new workers and training them will be high. By contrast, labor turnover will be relatively less costly for low skill jobs involving routine tasks and standardized technology. Thus, all else constant, skill replacing (augmenting) technological change would be expected to lower (raise) the cost of job termination to employers ($c_t \downarrow$).[15] The combined effect of these three forces is to lower the slope of the *uneven burden* line, $-(c_x + c_t t_x)x$, in Figure 3c, reducing the workers' share of income.[16]

It is not unusual for lopsided markets to self-correct overtime. The very distributional shift towards profits associated with low wages can stimulate economic growth, which can eventually soak up the excess labor making the process depicted in Figures 3(a-c) work in reverse.[17] However, that is not preordained as too much power asymmetry can impair market's ability to self-correct just as well. For instance, if the oversupply of labor is large enough the enforcement wage can potentially fall below the *living wage*, stunting labor productivity growth and raising enforcement costs. The overall effect could then be to reduce cooperation's positive effect on collective costs and private payoffs, locking in the economy in a suboptimal trajectory – the obverse of the effect of falling transaction costs depicted in Figure 5. Just as with long-distance merchants in Grief et al (1994), coalition building by workers can be a potential remedy, yet the larger the structural oversupply of labor the harder it would be for workers to act collectively. According to North (1993), a distinguishing characteristic, if not the main cause

[15] It is generally assumed that technological change has been mainly skill biased in the US in the 20th century. However, recent labor market trends bring into question if that is still the case given that the (college) education premium and the level of employment in high-skill occupations have stagnated since around 2000, if not actually begun to shrink (Beaudry, Green & Sand 2013, 2014; Autor 2014; Mishel, Shierholz & Schmitt 2013).

[16] See on labor's falling share of income since the 1980s, Hobijn & Sahin (2013) and in relation to productivity growth (Fleck, Glaser & Sprague 2011).

[17] Marx, for instance, envisioned that economic growth interacts cyclically with unemployment, i.e., what he calls the *reserve army of labor*. As in Goodwin's (1967) eloquent formulation, low wages raise profits and stimulate economic growth, and that in turn raises the demand for labor putting upward pressure on wages. But, the rise in wages overshoots and depresses profits, which checks growth lowering the demand for labor. The size of the reserve army of labor increases causing wages to fall again, and the cycle repeats itself.

of, underdevelopment is a state whose power is unchecked. Yet, at least equally important characteristic might be workers too powerless to deter opportunistic defection by employers who can profit from their weakness. It might not be unreasonable to think that when economy wide collective costs are borne primarily by groups that are least capable of absorbing them the unsavory effects on growth can be crippling over time.

IV. Conclusion

Voluntary exchange need not be on equal terms. All voluntariness implies is that traders' second best alternative to trading is yet inferior. Until recently, economists were content studying frictionless exchange under idealized equilibrium conditions, and their notion of collective cost did not go beyond negative spillovers. Asymmetric power has elicited little attention from economists over the years, and the complications it can cause in adjustment to equilibrium were traditionally assumed away. With the rise of transaction cost economics, there has been increased attention paid to enforcement institutions and the costs of market exchange. As often remarked, these cover a large array of costs that are very disparate. While some are individually borne others depend on interactions among traders and the rules that undergird market exchange. Depending on the nature of these rules and the institutions that enforce them, it might be profitable for maximizing agents to devote resources to improve their options at the expense of others. If so, they will strive to acquire (or increase their) pricing power and engage in strategic bargaining, thus eschewing cooperative bargaining when power is sufficiently asymmetric. But, such strategic behavior and contention over collective costs of exchange is socially costly as it lowers traders' joint payoff below its potential. The paper uses game theory to specify the conditions under which the players' joint payoff falls short of its potential in a dyadic game when the high power player maximizes her payoff.

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