

ON CORRUPTION AND INSTITUTIONS IN DECENTRALISED ECONOMIES

SVETLANA ANDRIANOVA*

Loughborough University

January 17, 2002

ABSTRACT. This paper studies opportunistic behaviour in a model of decentralised economic exchange and inadequate institutional framework of formal contract enforcement. It is shown that (i) when the number of cheating traders is sufficiently large, inadequate institutions result in a loss of decentralised trading contracts which suggests yet another explanation of the output fall puzzle of the recent transition experience; (ii) while being necessary for the attainment of a Pareto optimal outcome, an adequate institutional framework may not be sufficient if traders *perceive* it as inadequate; and (iii) in the presence of adequate institutional framework, even if enforcers are corrupt contractual breach is deterred when enforcers enjoy strong bargaining power.

KEYWORDS: Formal contract enforcement, corruption, transition economies.

JEL C70, D82, K42

*I would like to thank without implicating: Tim Worrall, Panicos Demetriades, Spiros Bougheas, and Tom Weyman-Jones for encouragement and constructive comments.

Address for correspondence: Department of Economics, Loughborough University, Leics LE11 3TU, UK.

E-mail: S.Andrianova@lboro.ac.uk.

'We are being asked to solve complex equations in multiple unknowns without so much as a multiplication table to guide us.'
Veniamin Iakovlev, Chairman of the Higher Commercial Court of the Russian Federation.¹

1 Introduction

This paper puts forward a simple framework for analysing the impact of institutions on the implementation of reforms in the formerly planned economies of Eastern Europe. The institution under study is formal contract enforcement which is widely regarded as an important ingredient of well-functioning markets. In the model I construct, an economic exchange is subject to opportunistic behaviour and may be undertaken in one of two sectors, labelled 'state' and 'market'. The two sectors differ in their trading potential as well as the effectiveness of contract enforcement. Trade in the state sector is less efficient than in the market (when measured in terms of an achievable trade surplus), but the state contract enforcement is more effective in curtailing opportunistic behaviour. In contrast, the market sector is able to deliver a higher trade surplus, but due to less effective deterrence of opportunistic behaviour, the higher trade surplus may fail to materialise.

The simple model presented here advances our understanding of salient facts about transition. Firstly, the analysis suggests that adequate institutional framework—specifically, effective contract enforcement which ensures a sufficiently high probability of punishment for contractual breach—is conducive to achieving a Pareto optimal outcome. Alternatively, inadequate formal enforcement of contracts is shown to lead to a loss of decentralised trading contracts, thus suggesting yet another explanation of the output fall puzzle observed in the initial years of post-communist transition, an explanation which emphasises informational and legal factors rather than technological ones (Blanchard and Kremer 1997, Roland and Verdier 1999). Secondly, and perhaps surprisingly, good enforcement *per se* may not be sufficient: agents' perceptions of the inadequacy of the legal system may force the reforming economy into an inferior outcome even when the level of enforcement is relatively high. In the stylised setting of this paper, the perception of the inadequacy of the legal system arises due to a negative enforcement externality: the higher the proportion of non-complying agents the more difficult it is to detect non-compliance. In such a case, the perception of a legal void leads to the highest level of undeterred opportunistic behaviour

¹ *Izvestiia*, July 3 1993, *cit op* Gustafson (1999, p. 151).

in the economy which, if combined with a large number of opportunists, forces honest agents to avoid the market altogether. The higher the enforcement externality, the higher the level of enforcement required to achieve a Pareto optimal outcome. For a sufficiently high enforcement externality, the perception of legal inadequacy has the most damaging effect: even the highest level of enforcement will not suffice to achieve the good equilibrium, because the fixed resources devoted to enforcement are spread too thinly for the number of non-complying agents. The analysis therefore suggests that some of the government's reform effort in transition should be directed towards both improving the adequacy as well as the perception of adequacy of the legal system to support markets.²

Finally, observers of the transition experience agree that wide-spread, and in some cases endemic, corruption played a critical role when reform efforts in Eastern Europe were deemed unsatisfactory.³ I therefore supplement the analysis of contract enforcement in a decentralised setting with a study of corruption. The findings presented here suggest that, other things equal, a Pareto optimal outcome is more difficult to achieve when enforcers are corruptible. In such a case, the strong enforcement of contracts must be complemented with a high enough number of honest enforcers, for the good equilibrium to exist. The analysis also uncovers the following surprising but intuitive result: when all enforcers are corrupt and enjoy strong bargaining power, but the enforcement institution itself is relatively effective in terms of a sufficiently high probability of breach detection, the Pareto optimal outcome exists as a unique equilibrium. In such a case, the opportunistic behaviour of suppliers is deterred because it is cheaper to honour the contract than engage in a bribing game with a corrupt enforcer. The analysis therefore suggests that strong institutions (e.g. adequate legal framework for a smooth functioning of markets) have an even greater importance in the economy with a high corruption level.⁴

²The positive correlation between the degree of success in liberalisation and a degree of adequacy of the legal framework in transition economies is well-documented (see Rubin (1998), Gray and Hendley (1997), and Borish and Noel (1996).

³This is the grabbing-hand paradigm of the state involvement in economic activity (see Frye and Shleifer (1997) and Djankov, La Porta, Lopez de Silanes, and Shleifer (2000).

⁴This analysis is also of relevance to the debate about public versus private ownership. The 'economy' in the model could be interpreted as a sector of the economy (e.g., health or education), with a part of the sector operating in the 'planned' (or directed) regime and the other part operating in a free market regime. The model proposed here could therefore be useful for understanding the role of law enforcement or regulation in combatting fraud and opportunism in the provision of health care, education, and pensions.

The rest of the paper is organised as follows. The model is introduced in section 2. The analysis follows in section 3, which first considers the benchmark case, then introduces an enforcement externality, and finally studies corruptibility of enforcers. Concluding remarks are supplied in Section 4.

2 Model

There are two equally sized large populations of risk-neutral players: buyers and sellers. In a one shot game, a buyer and a seller negotiate a contract $(z, p(z))$ whereby the seller agrees to deliver one unit of a product embodying a specified value of a quality parameter, $z \geq 0$, and the buyer agrees to pay the price $p(z) \geq 0$ up front.⁵ The net value that the buyer obtains from the product is given by $U = z - p(z)$. Provision of quality costs $c(z) \geq 0$ to the seller who gains $V = p(z) - c(z)$ if the contract is agreed. Three levels of quality are considered: high ($z = \bar{z}$), mediocre ($z = \underline{z}$), and low ($z = 0$), with $\bar{z} > \underline{z} > 0$. The corresponding costs and prices are: $c(\bar{z}) = \bar{c}$, $c(\underline{z}) = \underline{c}$, $c(0) = 0$, with $\bar{c} > \underline{c} > 0$; and $p(\bar{z}) = \bar{p}$, $p(\underline{z}) = \underline{p}$, $p(0) = 0$. Also, $\bar{z} > \bar{c}$ and $\underline{z} > \underline{c}$, so that signing a contract for quality $z > 0$ is worthwhile ex ante. Each player can only sign one contract. The outside options of buyers and sellers are normalised to zero.

All buyers are homogeneous. The population of sellers contains two types: opportunistic in proportion $\gamma \in (0, 1)$ and honest in proportion $1 - \gamma$. The seller's type is his private information. An honest seller never fails to honour the contract (say, due to a large 'psychic' cost of breaking promises), while an opportunist chooses whether to abide by the contract depending on the extent of contract enforcement. A contract is breached if the seller fails to deliver the contracted quality.

The economy is divided into two (productive) sectors: the market (or decentralised) sector of size $\mu \in (0, 1)$, and the state (or centralised) sector of size $1 - \mu$. The assignment of a seller to a sector is random, while buyers can choose the sector in which to trade. The two sectors (subscripted m and s) are distinguished by the following two factors. Firstly, the levels of quality contractible in each sector are $z_m = \{\bar{z}, 0\}$ and $z_s = \{\underline{z}, 0\}$. The assumption captures the idea that the sellers operating in the state sector cannot beat the market sellers in the level of contractible product quality (for $z > 0$) due to, say additional

⁵A contractual breach by the buyer (i.e. non-payment upon delivery) is thus excluded from the analysis.

costs of bureaucratic procedures on writing contracts in the state sector (or other deficiencies imposed by centralised information processing). Furthermore, $\bar{z} - \bar{c} > \underline{z} - \underline{c}$, so that (ignoring the problem of enforcement) a total trading surplus from a market contract is higher than that from a state contract.

The second factor which distinguishes the two sectors is the effectiveness of contract enforcement. This is assumed to be greater in the state sector. Again, by appealing to the centralised nature of contracting in the state sector, contract enforcement of state contracts is assumed to be perfect and any breach is remedied by *specific performance* which forces the breaching party to do exactly as the contract specifies. In contrast, market sector contracts are enforced only with some probability $\lambda \in (0, 1)$,⁶ and the enforcement is facilitated by *reliance damages*, $d > 0$, which stipulate a monetary payment from the breacher (seller) to the victim (buyer) such that the victim of breach is made as well off as if there had been no contract. Additional assumptions on the mechanism of enforcement are (i) enforcement is invoked immediately after the contractual breach has occurred, (ii) litigation costs are zero, and (iii) dispute resolution is instantaneous.⁷

The timing of the game is as follows.

- (1) Nature determines the type of every seller and assigns every seller to a sector.
- (2) Each buyer chooses the sector in which to purchase the product.
- (3) A buyer and a seller negotiate a contract. If they fail to agree, then each gets his outside option of 0. If the contract $(\tilde{z}, p(\tilde{z}))$ is agreed, the buyer pays $p(\tilde{z})$.
- (4) The seller delivers the product of quality z .
- (5) If a contract breach has occurred (i.e. if $z \neq \tilde{z}$), then the contract $(\tilde{z}, p(\tilde{z}))$ is enforced as follows: specific performance is enacted with probability 1 in the state sector, or a reliance damage measure is applied with probability λ in the market sector.
- (6) Payoffs are realized.

⁶ λ captures the situation in which the laws governing contract breach are inadequate or confusing, judiciary is unpredictable, and/or the information necessary for remedying the breach is partly verifiable.

⁷Assumptions (i) and (iii) are ruled out by the one-shot nature of the model. Incorporation of a positive litigation cost (relaxation of (ii)) is not expected to change the model's qualitative results.

3 Analysis

Given the sequential nature of the game, the appropriate solution method is backward induction: having determined the best strategy for the quality choice by an opportunistic seller in each sector at stage 4, I consider the buyers' best strategy for their choice of contract at stage 3 and their choice of sector at stage 2 given sellers' choice at stage 4. The methodology for deriving all the results in the paper is standard, and the proofs of all propositions are therefore omitted.⁸ Costly provision of quality implies that the equilibrium quality in this setting will be determined by the proportion of opportunistic sellers and the extent of formal contract enforcement. The analysis is restricted to pure strategies. Also, contractual prices are assumed to be fixed in a way that makes a buyer and a seller willing to sign the contract:

Assumption 1
$$\underline{c} < \underline{p} < \underline{z} \quad \text{and} \quad \bar{c} < \bar{p} < \bar{z}. \quad (\text{A1})$$

The state contract price \underline{p} is fixed by the planner, while the market contract price \bar{p} is assumed to be sticky due to sellers' menu-costs. Note that with a sticky market contract price, buyers' choice of sector in stage 2 would in general lead to an excess demand for a given sector. Should this be the case, the buyer's success (or failure) in achieving her choice of sector will be determined randomly by Nature, since all buyers are identical. Moreover, I shall assume that any excess demand for a given sector is absorbed by the other sector: the buyer who is not successful in obtaining a contract in her preferred sector has the opportunity to contract in the other sector. This seems to be a reasonable assumption for a setting in which the price is sticky and cannot adjust in response to excess demand.⁹

3.1 Benchmark case

When provision of quality is costly, an opportunistic seller in either sector prefers to supply a lower level of quality than contracted upon. Perfect contract enforcement in the state sector, however, forces opportunistic sellers to abide by the contractual terms and thus guarantees that the medium level of quality \underline{z} contractible in the state sector is delivered.

⁸The interested reader is referred to Andrianova (2001) for full details of the proofs of the results presented here, as well as an analysis of an endogenously determined market contract price.

⁹Andrianova (2001) shows that the alternative assumption—unsuccessful buyers do not have the opportunity to contract in the other sector—would strengthen the qualitative results presented below.

Consequently, perfect enforcement implies that the buyer in the state sector will optimally choose contract $(\underline{z}, \underline{p})$. The payoffs to the buyer and either type of seller are:

$$U_s(\underline{z}) = \underline{z} - \underline{p} \quad \text{and} \quad V_s(\underline{z}) = \underline{p} - \underline{c}. \quad (1)$$

Consider contracting under imperfect market contract enforcement. Denote by $q = \{0, 1\}$ an opportunistic seller's choice of breach ($q = 0$) or compliance with ($q = 1$) his contract (\bar{z}, \bar{p}) . Under the enforcement regime λ with the reliance damage measure $d = \bar{p}$, the expected payoffs to the buyer and each type of seller, superscripted by γ and $1 - \gamma$, are:

$$U_m(\bar{z}, \lambda) = [1 - \gamma(1 - q)] \cdot \bar{z} - [1 - \lambda\gamma(1 - q)] \cdot \bar{p}, \quad (2)$$

$$V_m^\gamma(\bar{z}, \lambda) = [1 - \lambda(1 - q)] \cdot \bar{p} - q \cdot \bar{c}, \quad (3)$$

$$V_m^{1-\gamma}(\bar{z}, \lambda) = \bar{p} - \bar{c}, \quad (4)$$

if contract (\bar{z}, \bar{p}) is agreed, or 0 otherwise. (If the buyer and the seller fail to agree on \bar{p} , it is implicitly assumed that taking her outside option is more attractive to the buyer than contracting for $z = 0$.¹⁰) In the above, q is set by the opportunistic seller so that (3) is maximised. Given the sellers' payoff-maximising value of q , the buyer expects to obtain \bar{z} in all cases except when she is matched with a breaching opportunist (with probability $\gamma(1 - q)$) and she expects to pay the price \bar{p} up front unless the breached contract is enforced (with probability $\lambda\gamma(1 - q)$). An honest seller complies with his contract (\bar{z}, \bar{p}) , and thus expects the payoff given by (4). An opportunistic seller expects to retain the up front payment \bar{p} unless his breach is enforced (with probability $\lambda(1 - q)$), while he expects to incur the cost of supplying high quality only if he complies (with probability q). In deciding whether to contract or take her outside option when in the market sector, the buyer takes into account the sellers' optimal choice of q and chooses the larger of the two payoffs: $U_m(\bar{z}, \lambda | q)$ or 0.

The buyer's equilibrium choice of sector at stage 2 will depend on (a) the fraction of buyers who choose the market sector, and (b) the size of her payoff from the market sector contract vis-a-vis that from the state sector contract. Given that any excess demand for one sector is absorbed by the other sector, the equilibrium allocation of (identical) buyers across the two sectors—namely μ buyers in the market sector and $1 - \mu$ buyers in the state sector—is, however, independent of an individual buyer's sector choice.¹¹

¹⁰This can be justified by assuming that signing a contract involves a small cost. It is clear that an incorporation of this cost into the analysis will not change the results.

¹¹Andrianova (2001) shows that the same equilibrium allocation of buyers across the two sectors would

Description of equilibria.

<i>Equilibrium</i>		<i>Contracting in which sector?</i>	<i>Economy trade surplus</i>
Strong enforcement (SE)	$q = 1$	state and market	$(1 - \mu)(\underline{z} - \underline{c}) + \mu(\bar{z} - \bar{c})$
Intermediate enforcement (IE)	$q = 0$	state and market	$(1 - \mu)(\underline{z} - \underline{c}) + \mu(1 - \gamma)(\bar{z} - \bar{c})$
Weak enforcement (WE)	$q = 0$	state only	$(1 - \mu)(\underline{z} - \underline{c})$

Consider possible equilibria of the sequential game. Recall that opportunistic sellers in the market may choose to breach ($q = 0$) or honour ($q = 1$) their contract for quality \bar{z} . Also, seller of either type prefers contracting to no contracting by assumption. Buyers who end up in the state sector prefer contracting for \underline{z} to their outside option since $U_s(\underline{z}) > 0$, given the perfect enforcement of state sector contracts. Buyers who end up in the market sector prefer contracting for \bar{z} to their outside option if $U_m(\bar{z}, \lambda | q) > 0$, or take their outside option if $U_m(\bar{z}, \lambda | q) \leq 0$. We therefore have three candidates for equilibria in this game and these are listed in the table above. Which of these surpluses are attained in equilibrium is given in the following

Proposition 1 *Assume (A1) and let $\hat{\lambda} \equiv [\bar{p} - (1 - \gamma)\bar{z}]/(\gamma\bar{p})$. There exists a unique equilibrium of the game and it is (i) SE if $\lambda > \bar{c}/\bar{p}$, (ii) IE if $\hat{\lambda} < \lambda \leq \bar{c}/\bar{p}$ and $\gamma < (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$, or (iii) WE if $\lambda \leq \min \{ \hat{\lambda}; \bar{c}/\bar{p} \}$.*

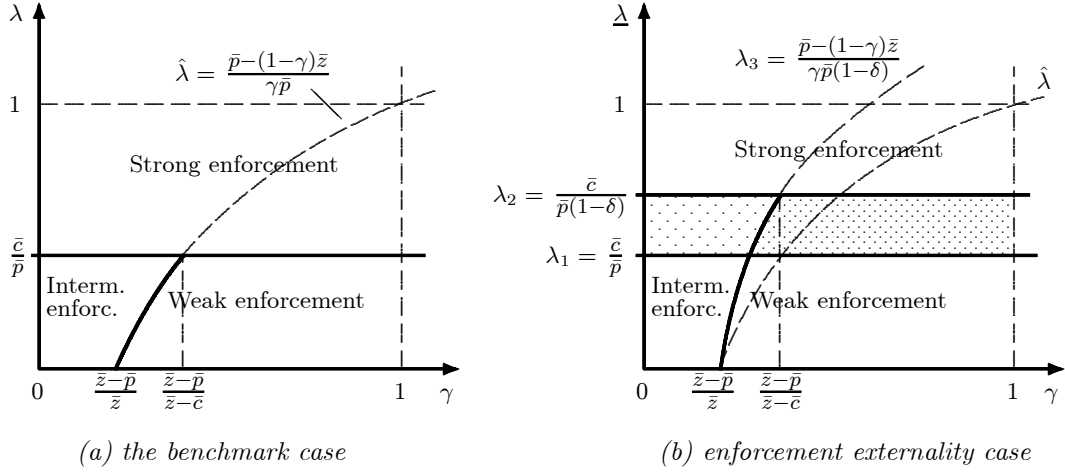
The intuition behind the proposition is straightforward. A sufficiently high probability of formal contract enforcement (case li) forces opportunistic sellers to comply with the terms of their contract thus making it attractive for the buyers in the market to contract for quality \bar{z} . For a given sector size, all beneficial trades are realized in the entire economy. In contrast, a low probability of enforcement (case liii) makes the market contract inferior compared to the buyers' outside option and beneficial trades in the market are lost. In the intermediate equilibrium (case lii), the probability of enforcement is high enough while the proportion of breaching sellers is small enough, so that the combination of these two parameters makes the buyer's expected payoff from the market contract for \bar{z} larger than

result even if the market contract price were to adjust in response to an excess demand.

her outside option and thus induces those buyers who are in the market to contract even though enforcement is not sufficient to deter breach by opportunistic market sellers.

Fig.1(a) illustrates Prop.1 and suggests that SE equilibrium would disappear if \hat{p} is close to \bar{c} . In other words, it is more difficult to achieve compliance when the bargaining power

FIGURE 1: *Equilibria of the game*



of the buyers is high. If this is so, then even a relatively high probability of formal contract enforcement is not sufficient to deter breach of market contracts by opportunistic sellers. Intuitively, when the buyers can extract most of the trade surplus, opportunists do not have a large enough stake in the contract (\bar{z}, \hat{p}) and would prefer to breach it even when enforcement is highly likely.

It immediately follows from Prop.1 that liberalisation of the economy (a rise in μ) leads to a higher welfare when enforcement of market contracts is strong (1i) and/or proportion of opportunists is low (1ii). Otherwise (1iii), an increase in the size of the market leads to an inferior outcome for this economy, since a large number of potentially beneficial trades are lost.

3.2 Endogenous enforcement technology

This section introduces and analyses a negative enforcement externality: because the resources devoted to enforcement are fixed, the likelihood of enforcement will decline with the rise of the fraction of breached market contracts. Formally, let $\lambda(q) = \underline{\lambda} \cdot (1 - \delta \cdot (1 - q))$, where $\underline{\lambda}$ is the exogenous level of enforcement available in the economy, q is the probabil-

ity with which opportunistic sellers comply with their market contract, and $\delta \in (0, 1)$ is the enforcement externality parameter, introduced to capture fixed resources available for enforcement. For a given proportion of breaching opportunists, the larger the externality, δ , the lower is the probability of enforcement, $\lambda(q)$. By construction, enforcement is more likely the fewer breached contracts there are: $\lambda(0) = \underline{\lambda} \cdot (1 - \delta) < \underline{\lambda} = \lambda(1)$.

As in section 3.1, the following cut-off value functions are derived for the exogenous level of the enforcement probability:

$$\text{if } \underline{\lambda} > \frac{\bar{c}}{\bar{p}} \equiv \lambda_1 \quad \text{then } V_m^\gamma(\bar{z}, \lambda)|_{q=1} > V_m^\gamma(\bar{z}, \lambda)|_{q=0}, \quad (5)$$

$$\text{if } \underline{\lambda} \leq \frac{\bar{c}}{\bar{p}(1 - \delta)} \equiv \lambda_2 \quad \text{then } V_m^\gamma(\bar{z}, \lambda)|_{q=1} \leq V_m^\gamma(\bar{z}, \lambda)|_{q=0}, \quad (6)$$

$$\text{if } \underline{\lambda} \leq \frac{\bar{p} - (1 - \gamma)\bar{z}}{\gamma\bar{p}(1 - \delta)} \equiv \lambda_3 \quad \text{then } U_m(\bar{z}, \lambda; q = 0) \leq 0. \quad (7)$$

Comparison of these three cut-offs for $\underline{\lambda}$ suggests that, in contrast to the results in section 3.1, the equilibrium may no longer be unique.

Proposition 2 *Assume (A1). Then for any $\delta \in (0, 1)$ there exists a (pure strategy) equilibrium of the game.*

2.1 *The equilibrium is unique and it is (i) SE if $\underline{\lambda} > \lambda_2$ and $\delta < 1 - \bar{c}/\bar{p}$, (ii) IE if $\lambda_3 < \underline{\lambda} \leq \lambda_1$, or (iii) WE if $\underline{\lambda} \leq \min\{\lambda_1, \lambda_3\}$.*

2.2 *Otherwise, if $\lambda_1 < \underline{\lambda} \leq \lambda_2$ the equilibrium is not unique:*

(i) *if $\max\{\lambda_1, \lambda_3\} < \underline{\lambda} \leq \min\{\lambda_2, 1\}$ then SE and IE equilibria coexist;*

(ii) *or if $\lambda_1 < \underline{\lambda} \leq \min\{\lambda_2, \lambda_3, 1\}$ then SE and WE equilibria coexist.*

Fig.1(b) illustrates the proposition for the case when $\delta < 1 - \bar{c}/\bar{p}$ and therefore $\lambda_2 < 1$. The shaded area in the figure depicts the range of parameters in which the two pure strategy equilibria coexist: SE and IE in the sparsely shaded area, or SE and WE in the densely shaded area. Fig.1(b) also highlights the significance of the enforcement externality: if it is sufficiently high ($\delta \geq 1 - \bar{c}/\bar{p}$), then $\lambda_2(\gamma)$ shifts out to the level of 1 or beyond, and multiple equilibria exist for any reasonably high value of the exogenous enforcement level, $\underline{\lambda} > \bar{c}/\bar{p}$.

The intuition behind the existence of multiple equilibria is straightforward. In each region of multiple equilibria (the densely and sparsely shaded areas in Fig.1(b)), both com-

pliance ($q = 1$) and breach ($q = 0$) by opportunistic sellers are optimal.¹² The negative externality in contract enforcement leads to a situation in which the equilibrium is determined by what every seller believes all other sellers are going to do. If a seller believes that all other sellers are breaching their market contract, then it is unprofitable to deviate from this strategy by complying because compliance is costly (involves cost \bar{c}), while the breach is detected with a low probability because the exogenously fixed enforcement resources are spread thinly over the large number of breachers. Similarly, if a seller believes that all other sellers are going to comply, then his breach of the market contract is costly due to a high probability of detection: all the enforcement resources in such a case will be devoted to detecting the seller's breach.

The argument above yields the following policy implication for transition economies. Decentralisation of economic activity will increase the size of the market sector, μ , which in turn will require more enforcement. Citizens' perception of effectiveness of enforcement may, however, vary over the sectors. If everyone believes that the market transactions are unpoliced, then everybody in the market sector will find it optimal to breach their contract, further undermining the public perception of the effectiveness of formal contract enforcement. The larger the enforcement externality, the more detrimental could decentralisation turn out to be because the multiplicity of equilibria is more likely for higher δ . The reformers-in-charge could improve the situation by publicising measures which reduce this externality: e.g. by adopting a tough stance towards all breaches of law. Of course, this prescription can only be pushed so far as the fixed resources allow it to be credible to the populace.

3.3 Corruptible enforcers

Suppose that at date 5 *Nature* determines whether the market contract (\bar{z}, \bar{p}) between a given buyer-seller pair is 'enforceable' (with probability λ) or 'not enforceable' (with probability $1 - \lambda$). Crucially, the realized state of the world with regard to enforceability of the contract is now private information of the enforcer (while the value of λ is common knowledge, as before). Thus the source of corruption in market contract enforcement is due

¹²The difference between the two areas of multiple equilibria in Fig.1(b) involves the buyers' choice of contracting vis-à-vis their outside option when in the market sector and $q = 0$.

to the informational advantage possessed by the enforcer.¹³ A contractual breach, when it occurs, is remedied by a self-interested enforcer (the supervisor) who may well prefer not to take any enforcement action in exchange for a bribe from the seller.

If the contract is not enforceable—whether genuinely so or because of corruption in enforcement—no further action is taken by the enforcer. To maintain the focus on imperfect enforcement of contracts in the market, I continue to assume that there is no uncertainty with respect to enforceability of contracts in the state sector (i.e. the enforcer of the state contract does not possess any private information regarding contract enforceability).¹⁴ The level of corruption in the economy is assumed to be exogenous: a contract enforcer is corruptible with probability $0 < r \leq 1$ in which case he will accept a bribe $b > 0$ in exchange for concealing the information regarding enforceability of the market contract.¹⁵

Consider the bribe payment which the seller will be prepared to pay to the enforcer in order to conceal the fact that the contract is, in fact, enforceable. If the enforcer agrees to conceal, then the seller expects no enforcement at the cost of the bribe payment, $\bar{p} - b$. Otherwise, in the absence of a collusive agreement with the enforcer, the seller expects to obtain $\bar{p} - d = 0$. For bribery to occur, therefore, the bribe cannot exceed \bar{p} . Let $b = k\bar{p}$ with $0 < k < 1$ representing the bargaining power of the enforcer.

Before calculating the players' expected payoffs in the modified game, observe that an honest seller's expected gain from the market contract (\bar{z}, \bar{p}) , as specified in (4), is not affected by considerations of corruption simply because corruption is only possible once a contract is breached (while honest sellers are assumed to comply with their contracts without fail).¹⁶ On signing contract (\bar{z}, \bar{p}) in the environment with corruptible enforcers, the expected payoff to a buyer and an opportunistic seller respectively becomes:

$$U_m(\bar{z}, \lambda, r) = [1 - \gamma(1 - q)] \cdot \bar{z} - [1 - \lambda\gamma(1 - q)(1 - r)] \cdot \bar{p}, \quad (8)$$

¹³This seems to be a reasonable assumption in the context of complicated or overlapping legislation with loopholes, as reported to have been the case in the initial years of reforms in countries of Eastern Europe (Hay and Shleifer 1998, Rubin 1997, Pistor 1996, Greif and Kandel 1995, Gray 1993).

¹⁴Corruption of enforcers in the state sector is also possible and several scenarios can be envisaged to give rise to a negative spillover effect on the enforcement of market contracts. The results presented in this section will then be even stronger.

¹⁵The analysis of the incentives of the enforcer to get corrupt is therefore left out.

¹⁶Allowing for framing or blackmail by enforcers may well reverse this conclusion. See Polinsky and Shavell (2001) for an analysis of framing in law enforcement.

$$V_m^\gamma(\bar{z}, \lambda, r) = \left[1 - \lambda(1 - q)[1 - r(1 - k)]\right] \cdot \bar{p} - q\bar{c}, \quad (9)$$

where q is chosen by the opportunistic seller in order to maximise (9), as before. The seller expects to incur the cost of providing the high quality if he complies with the contract (probability q). He will keep the buyer's up front payment, \bar{p} , unless he breaches the contract (probability $1 - q$). In the latter case, the breach is either remedied by an honest enforcer (with probability $\lambda(1 - r)$), and the seller loses the up front payment; or the breach is not remedied because the enforcer is bribed (with probability λr), the seller then loses k portion of the up front payment. When enforcers are corruptible, the buyer's gain, (8), from the contract (\bar{z}, \bar{p}) is smaller by $\lambda\gamma(1 - q) \cdot r \cdot \bar{p}$, as compared to the no corruption market contract payoff (2), namely it is smaller by the expected loss of the up front payment in all circumstances except when the breach is remedied by an honest enforcer.

Proposition 3 *Assume (A1) and $0 < k < 1$. Then there exists a unique (pure strategy) equilibrium of the game with corruptible enforcers and it is WE equilibrium, unless*

- (i) $\lambda > \bar{c}/[\bar{p}(1 - r(1 - k))]$ and $r \leq \min \{[\bar{p} - \bar{c}]/[\bar{p}(1 - k)]; 1\}$, in which case it is SE; or
- (ii) $[\bar{p} - (1 - \gamma)\bar{z}]/[\gamma\bar{p}(1 - r)] < \lambda \leq \bar{c}/[\bar{p}(1 - r(1 - k))]$, $\gamma < (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$, and $r < [\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c})]/[\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) + k(\bar{p} - (1 - \gamma)\bar{z})]$, in which case it is IE.

The intuition behind Prop.3 is simple. For buyers to prefer contracting in the market to their outside option, enforceability of contract (\bar{z}, \bar{p}) must be sufficiently high, as in either 3i or 3ii. In addition, for an opportunistic seller to prefer compliance, and thus for SE equilibrium to exist cost of breach must be large enough (e.g. the number of corruptible enforcers is relatively small). As before, in IE equilibrium some contract enforceability per se is not sufficient to deter breach by all opportunistic sellers in the market; the buyers however prefer market contracting because the expected value of (\bar{z}, \bar{p}) contract is higher than their outside option. In the environment with corruptible enforcers, this would be the case when both the proportion of breaching sellers as well as the level of corruption among the enforcers is small enough. When neither of these two scenarios is possible, then it is less harmful for the buyers to opt out of market contracting altogether. Two observations immediately follow from Prop. 3:

Remark 1 *SE equilibrium is more difficult to sustain when enforcers are corrupt.*

The proof is a straightforward comparison of the cut-off in the statement of Prop.3(i) with its analogue in the no-corruption environment of section 3.1, \bar{c}/\hat{p} . Clearly, the former exceeds the no-corruption cut-off for any $0 < k < 1$ and $0 < r \leq 1$. The remark implies that when contract enforcers are corruptible the institution of formal contract enforcement needs to be more effective (the probability that the contract is enforceable has to be higher) for opportunistic sellers to choose compliance in equilibrium.

Remark 2 *Assume (A1) and $r = 1$. If additionally $k > \bar{c}/\bar{p}$, then SE equilibrium prevails despite the high level of corruption in enforcement of market contracts.*

Intuitively, breach of market contracts will not occur when all enforcers are corrupt, have sufficiently strong bargaining power, and are large in number. To check this result, note that by Prop.3(i), in the specified range of parameters the opportunistic sellers optimise by setting $q = 1$, thus making the buyers in the market to prefer contract (\bar{z}, \bar{p}) over their outside option. The key to understanding this result is the strong bargaining power enjoyed by the corrupt market contract enforcer when formal enforcement is relatively effective (λ is high enough): since all enforcers are corrupt, a breached contract is certain to attract an enforcer's demand for a bribe (due to $r = 1$), and thus the breaching seller stands to lose a large part of the gain from his breach (due to $k > \bar{c}/\bar{p}$). It is cheaper for the seller to comply with his market contract than to get involved in the bribing game. Hence, corruptibility of enforcers who can extract large bribes serves as a deterrent to contract breach. This result highlights the relative importance of strengthening formal institutions in an economy with a high level of corruption (i.e, increasing the value of λ above the threshold given by Prop.3(i)). An improvement in formal institutions supporting markets is beneficial in curbing opportunistic behaviour of both private agents (sellers) as well as holders of public office (enforcers).

4 Concluding comments

The results of this paper highlight the importance of institutions for the transition from plan to market: absent or inadequate institutions lead to a loss of beneficial decentralised contracts. Moreover, when formal contract enforcement exhibits a negative externality, then even for a relatively large amount of fixed resources devoted to enforcement bad equilibrium may prevail, because the equilibrium is determined by trader's perception of the effectiveness

of enforcement. The larger the externality, the harder it is to achieve the good equilibrium in which all traders comply with their contractual obligations. The effect of a large externality on the welfare of the economy is indirect and feeds through the overall trading surplus. The larger the size of the market, the higher is the proportion of the beneficial trades which are lost in the weak enforcement equilibrium. This conclusion is likely to become even more grim if we accept that a large-scale change in the organisation of economic activity (e.g., a change from ‘plan to market’) is likely to require new laws which are better suited to the new economic order. In the notation of the model this means that the probability of enforcement, λ , may decline (or the enforcement externality, δ , rise) due to, perhaps a perception of, inadequacy of the old legal framework. And this, as the epigraph to this paper suggests, seems to be exactly what has happened in some transition economies. Perhaps more importantly, the analysis also suggests that institutions to support market interaction have a first order effect on the success of liberalisation in an environment of endemic corruption. This is because (a) corruption makes the good equilibrium less feasible, and (b) an effective legal framework helps to curb the high level of corruption in enforcement, as well as opportunism in contracting, by exposing the breacher to extortionary bribe demands of the enforcer.

The simple nature of the model presented here offers a number of fruitful avenues for future research. Firstly, allowing for repeated interaction could help evaluate the relative significance of formal mechanisms of enforcement versus informal ones. Survey-based evidence for the reforming economies of Eastern Europe (McMillan and Woodruff (1999b, 1999a, 2000) and Johnson, McMillan, and Woodruff (2000)) indicates that inadequacy of the legal infrastructure of laws, courts and police inherited from the years of directives and planning forces businesses to rely on reputation (e.g., gossip, social and/or business networks). Informal enforcement supported by information sharing cannot however substitute for formal enforcement entirely: while reputation helps to sustain established trading partnerships, effective courts encourage formation of new relationships by lowering switching costs and reducing risks.¹⁷ These empirical findings therefore call for a detailed theoretical analysis of the relative merits of a particular enforcement mechanism in different

¹⁷Note, however, that the results presented in section 3.2 suggest that reliance on a reputational mechanism such as trust to support cooperation when formal enforcement mechanisms are ineffective may be problematic: if economic agents believe there is a high probability of opportunism, then lack of formal institutions combined with lack of trust will force the economy into a bad equilibrium.

types of economic environment.¹⁸ Secondly, the issue of financing formal enforcement, e.g. by means of taxes, could be studied. The existing literature suggests¹⁹ that excessive taxation is typically the reason for the growth of the unofficial economy, which in some notable instances has led to the rise of organised crime and further undermined the development of adequate institutions that support well-functioning markets. Thirdly, the size of the market could be endogenised: it is natural to think of the market sector size as being determined by the proportion of sellers who prefer to operate in that sector. This line of inquiry is of interest for example for an evaluation of a privatisation programme. Fourthly, the effectiveness of the enforcement technology is likely to be determined by the size of the sector where it is employed: this would allow a better description of what happens in the economy as the size of the sector changes (e.g., as the economy liberalises). And lastly, it is of interest to analyse the optimal (government) allocation of limited resources for enforcement across sectors. Intuitively, the resources should be concentrated in the market sector, since it offers a higher return, however, the higher return will presumably attract a larger proportion of opportunistic traders.

References

- ANDRIANOVA, S. (2001): "On Corruption and Institutions in Decentralised Economies," Loughborough University, Department of Economics Discussion Paper # 01-06.
- BLANCHARD, O., AND M. KREMER (1997): "Disorganization," *Quarterly Journal of Economics*, 112(4), 1091–1126.
- BORISH, M. S., AND M. NOEL (1996): *Private Sector Development During Transition*. Washington, DC: World Bank.
- DIXIT, A. (2001): "On Modes of Economic Governance," Presidential Address, Econometric Society.
- DJANKOV, S., R. LA PORTA, F. LOPEZ DE SILANES, AND A. SHLEIFER (2000): "The Regulation of Entry," Harvard Institute of Economic Research Discussion Paper # 1904.
- FRYE, T., AND A. SHLEIFER (1997): "The Invisible Hand and the Grabbing Hand," *American Economic Review*, 87(2), 354–8.
- GRAY, C. W. (1993): "Evolving Legal Frameworks for Private Sector Development in Central and Eastern Europe," Washington, DC: World Bank Discussion Paper # 209.

¹⁸A recent formal analysis in Dixit (2001) offers a fruitful framework in which to tackle a comparative study of different enforcement mechanisms.

¹⁹E.g., Johnson, Kaufmann, McMillan, and Woodruff (2000) and Roland (2000, pp. 174–8).

- GRAY, C. W., AND K. HENDLEY (1997): "Developing Commercial Law in Transition Economies: Examples from Hungary and Russia," in *The Rule of Law and Economic Reform in Russia*, ed. by J. D. Sachs, and K. Pistor. Westview Press, Harvard University Russian Research Center. The John M. Ohlin Critical Issues Series.
- GREIF, A., AND E. KANDEL (1995): "Contract Enforcement Institutions: Historical Perspective and Current Status in Russia," in *Economic Transition in Eastern Europe and Russia: Realities of Reform*, ed. by E. P. Lazear. Hoover Institution Press.
- GUSTAFSON, T. (1999): *Capitalism Russian-Style*. Cambridge University Press.
- HAY, J. R., AND A. SHLEIFER (1998): "Private Enforcement of Public Laws: A Theory of Legal Reforms," *American Economic Review*, 88(2), 398–403.
- JOHNSON, S., D. KAUFMANN, J. McMILLAN, AND C. WOODRUFF (2000): "Why Do Firms Hide? Bribes and Unofficial Activity after Communism," *Journal of Public Economics*, 76, 495–520.
- JOHNSON, S., J. McMILLAN, AND C. WOODRUFF (2000): "Courts versus Relational Contracts," Stanford University: Mimeograph.
- McMILLAN, J., AND C. WOODRUFF (1999a): "Dispute Prevention Without Courts in Vietnam," *Journal of Law, Economics and Organization*, 15(3), 637–658.
- (1999b): "Interfirm Relationships and Informal Credit in Vietnam," *Quarterly Journal of Economics*, 114, 1285–1320.
- (2000): "Private Order under Dysfunctional Public Order," *Michigan Law Review*, 98, 2421–2458.
- PISTOR, K. (1996): "Supply and Demand for Contract Enforcement in Russia: Courts, Arbitration, and Private Enforcement," *Review of Central and East European Law*, 22(1), 55–87.
- POLINSKY, A. M., AND S. SHAVELL (2001): "Corruption and Optimal Law Enforcement," *Journal of Public Economics*, 81, 1–24.
- ROLAND, G. (2000): *Transition and Economics: Politics, Markets, and Firms*. The MIT Press, Cambridge, Massachusetts.
- ROLAND, G., AND T. VERDIER (1999): "Transition and the Output Fall," *Economics of Transition*, 7(1), 1–28.
- RUBIN, P. H. (1997): *Promises, Promises: Contracts in Russia and other Post-Communist Economies*, The Shaftesbury Papers, 11. Edward Elgar.
- (1998): "Legal Reform in Eastern Europe," in *The New Palgrave Dictionary of Economics and the Law*, ed. by P. Newman, pp. 549–59. Macmillan Reference Limited.

Appendix [Not for publication]

Proof of Proposition 1

Suppose $\lambda > \bar{c}/\bar{p}$. Then $V_m^\lambda(\bar{z}, \lambda | q = 1) = \bar{p} - \bar{c} > (1 - \lambda)\bar{p} = V_m^\lambda(\bar{z}, \lambda | q = 0)$ and hence $q = 1$ is optimal, which in turn leads to $U_m(\bar{z}, \lambda | q = 1) = \bar{z} - \bar{p} > 0$, i.e. buyers who are in the market prefer contracting over their outside option. The buyers' choice of a sector is determined by the sign of the difference $(\bar{z} - \bar{p}) - (\underline{z} - \underline{p})$, which may or may not be positive. Irrespective of the sign, in equilibrium μ buyers will end up in the market sector and $1 - \mu$ in the state sector. This proves part (i) of the proposition.

Suppose instead that $\lambda \leq \bar{c}/\bar{p}$ and hence $q = 0$ is optimal. Substituting $q = 0$ into (2), it is checked that $U_m(\bar{z}, \lambda | q = 0) \leq 0$ if

$$\lambda \leq \frac{\bar{p} - (1 - \gamma)\bar{z}}{\gamma\bar{p}} \equiv \hat{\lambda}, \quad \text{where } \hat{\lambda} \in [0, 1] \quad \text{when } \gamma \in \left[\frac{\bar{z} - \bar{p}}{\bar{z}}; 1 \right]. \quad (10)$$

If (10) and $\lambda \leq \bar{c}/\bar{p}$, or re-stating, if $\lambda \leq \min\{\hat{\lambda}, \bar{c}/\bar{p}\}$, then due to $U_s > 0 \geq U_m(\bar{z}, \lambda | q = 0)$ every buyer prefers the state sector, but when unsuccessful in obtaining the state contract she will opt out of market contracting. This proves part (iii).

Finally, when $\hat{\lambda} < \lambda \leq \bar{c}/\bar{p}$, then $q = 0$ and $U_m(\bar{z}, \lambda | q = 0) > 0$, while $U_m(\bar{z}, \lambda | q = 0)$ could be either lower or higher than $U_s(\underline{z})$. The buyers who ended up in the market sector will prefer to contract for \bar{z} despite the certainty of the breach by opportunistic sellers. \square

Proof of Proposition 2

Consider all ranges of $\underline{\lambda}$ which are determined by the three cut-off values λ_1 , λ_2 and λ_3 defined in (5)–(7). It is easy to check that $\lambda_1 < \lambda_2$ for any $\delta \in (0, 1)$; $\lambda_2 \leq \lambda_3$ if $\gamma \geq (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$; and $\lambda_2 < 1$ if $\delta < 1 - \bar{c}/\bar{p}$. The following statements are easily established.

If $\underline{\lambda} \leq \min\{\lambda_1, \lambda_3\}$, then the unique optimal choice of opportunistic sellers is $q = 0$ and buyers prefer not to contract in the market due to $U_m(\bar{z}, \lambda | q = 0) \leq 0$. Therefore, WE equilibrium exists and it is unique. If $\lambda_3 < \underline{\lambda} \leq \lambda_1$, then for the unique equilibrium choice of $q = 0$ by opportunistic sellers, the buyers now prefer to contract in the market due to $U_m(\bar{z}, \lambda | q = 0) > 0$, thus making IE equilibrium unique for this range of $\underline{\lambda}$. If $\underline{\lambda} > \lambda_2$ (provided that $\lambda_2 < 1$ which is equivalent to $\delta < 1 - \bar{c}/\bar{p}$), then the opportunistic sellers' unique choice at stage 4 of the game is $q = 1$. Hence, the buyer will prefer contracting to her outside option irrespective of the sector in which she ends up. Therefore in this range SE equilibrium is feasible and unique, which establishes part 2.1 of the proposition.

To check that the validity of the proposition regarding the multiple equilibria, it suffices to observe that the choice of action at stage 4 by opportunistic sellers is not unique when $\lambda_1 < \underline{\lambda} \leq$

$\min\{\lambda_2, 1\}$. This choice could be either $q = 1$ or $q = 0$ depending on the belief of every opportunistic seller about the choice all other opportunistic sellers are going to make. If $q = 1$ is played in equilibrium, then the optimal choice of buyers in the market is to contract for \bar{z} (thus SE equilibrium is feasible). If the sellers' equilibrium choice is $q = 0$, then the buyers' optimal choice will depend on the sign of $U_m(\bar{z}, \lambda \mid q = 0)$. If it is positive (this would be the case for $\underline{\lambda} > \lambda_3$) then IE equilibrium is feasible. Alternatively, when it is non-positive then WE equilibrium is feasible. \square

Proof of Proposition 3

For SE equilibrium, the opportunistic sellers must optimally set $q = 1$, which gives $V_m^\gamma(\bar{z}, \lambda, r)|_{q=1} > V_m^\gamma(\bar{z}, \lambda, r)|_{q=0}$ and this in turn gives the condition on λ stated in Prop 3(i). As previously, when $q = 1$, the buyers in the market will prefer contracting to their outside option. Thus part (i) of the Proposition is proved.

In IE equilibrium, all opportunistic sellers optimally breach their contract (\bar{z}, \bar{p}) , while the buyers prefer market contracting to their outside option despite the certainty of the breach by opportunists. These two conditions translate into the following:

$$V_m^\gamma(\bar{z}, \lambda, r)|_{q=1} \leq V_m^\gamma(\bar{z}, \lambda, r)|_{q=0}, \quad (11)$$

$$U_m(\bar{z}, \lambda, r \mid q = 0) > 0. \quad (12)$$

Writing out the payoffs, as specified by (8) and (9), and substituting the relevant value for q , the two inequalities above result in

$$\frac{\bar{p} - (1 - \gamma)\bar{z}}{\gamma\bar{p}} \cdot \frac{1}{1 - r} \stackrel{(12)}{<} \lambda \stackrel{(11)}{\leq} \frac{\bar{c}}{\bar{p}} \cdot \frac{1}{1 - r(1 - k)}. \quad (13)$$

Note that the first inequality sign will be true for any $\lambda \in (0, 1)$ if $\gamma \leq (\bar{z} - \bar{p})/\bar{z}$. Therefore, consider

$$\gamma > (\bar{z} - \bar{p})/\bar{z}. \quad (14)$$

For the existence of IE equilibrium, the two end points of the range given by (13) must be compatible, which after re-arranging translates into:

$$\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) > r \cdot \left\{ \bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) + k \cdot [\bar{p} - (1 - \gamma)\bar{z}] \right\}. \quad (15)$$

Denoting the term in curly brackets by $\{D\}$, the solution to (15) is given by:

$$\text{If } \{D\} > 0, \text{ then } r < \frac{\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c})}{\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) + k \cdot [\bar{p} - (1 - \gamma)\bar{z}]}, \quad (16)$$

$$\text{if } \{D\} < 0, \text{ then } r > \frac{\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c})}{\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) + k \cdot [\bar{p} - (1 - \gamma)\bar{z}]}, \quad (17)$$

$$\text{if } \{D\} = 0, \text{ then } 0 < r \leq 1 \text{ and } \gamma < \frac{\bar{z} - \bar{p}}{\bar{z} - \bar{c}}. \quad (18)$$

It needs to be checked in (16)–(18) above that $k \in (0, 1)$ and, if relevant, $r \in (0, 1]$. Specifically, since $k > 0$, the condition $D = 0$ in (18) implies $\gamma > [\bar{z} - \bar{p}]/[\bar{z} - \bar{c}]$, which is a direct contradiction to the

statement in (18). In (17), $\{D\} < 0$ together with (14) and $k > 0$ implies $\gamma > [\bar{z} - \bar{p}]/[\bar{z} - \bar{c}]$, which in turn implies that the inequality with r in (17) has the RHS > 1 , and hence is impossible to satisfy when $r \in (0, 1]$. Lastly, turning to (16), $\{D\} > 0$ implies that either $k > [\gamma(\bar{z} - \bar{c}) - (\bar{z} - \bar{p})]/[\bar{p} - (1 - \gamma)\bar{z}]$ and $\gamma > (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$, or $k \in (0, 1)$ and $\gamma \leq (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$. If $\gamma > (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$ while $\{D\} > 0$, then the inequality with r has the RHS < 0 , and thus cannot be satisfied for $r \in (0, 1]$. We are therefore left with the solution $k \in (0, 1)$ and $\gamma \leq (\bar{z} - \bar{p})/(\bar{z} - \bar{c})$ to (15), which together with $r < [\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c})]/\{\bar{z} - \bar{p} - \gamma(\bar{z} - \bar{c}) + k \cdot [\bar{p} - (1 - \gamma)\bar{z}]\}$ and (13) supports IE equilibrium. By completeness, in all other ranges of parameters (except those listed in parts (i) and (ii) of the Proposition), $q = 0$ is optimal while $U_m(\cdot | q = 0) < 0$. Therefore buyers in the market opt out of contracting. \square