Empirical Essays

on

Emergence of Economic Transaction

Mechanism:

Case of Trade Credit in China

（経済取引メカニズム形成に関する実証研究：中国の企業間信用の事例）

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論文の内容の要旨

論文題目

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China （経済取引メカニズム形成に関する実証研究：中国の企業間信用の事例）

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　本研究は、経済取引を支える統治メカニズムの実態を調査し、理論的に考察した上、実
証的に分析したものである。

　企業が行う取引のうち、商品の購入とその代金の支払いは、もっとも基礎的な経済行為
である。そして、商品の購入と代金の支払いの時点をずらすことで、企業間で与信という
金融取引も発生させることができる。この代金の支払いを履行させるメカニズムが十分に
機能することで、経済取引を効率化し、経済成長を促す、と考えられる。そして、この経
済取引を安定的にするメカニズムを理解することは、開発途上国、移行経済国の経済成長
を可能にする要因のひとつを理解することにもつながる。

　中国では、1978 年に計画経済から市場経済への転換をスタートさせた際に、この企業間
取引を統治するメカニズムが一度完全に崩壊した。この結果、1980 年代の末には、企業は
商品を販売しても代金を回収できず、資金繰りが滞ったために生産活動が停止し、経済活
動全体も停滞するという事態にまで陥った。1990 年代から 2000 年にかけて、中国をはじめ
とする移行経済国の全てで、代金の回収をめぐる混乱が発生していた。筆者は、当時市場
経済の移行プロセスの実態を調査する中でこの混乱した事態を中国各地で目にし、その後
当事者がどのように対応していくのかを観察することができた。この経験が筆者の本研究
を始める動機となり、本研究の分析の対象となった。その後、観察を続ける中で、通常の
発展途上国、先進国では目にすることのできない、統治メカニズムが再構築されるプロセ
スを、自分が観察していると感じるようになっていたためである。

　当時、経済学の分野でもこうした現象に注目した研究が現れはじめていた。先行文献を
みると、まずこの企業間取引を統治するメカニズムの実態を把握しよう、という実証研究
が多く現れた。McMillan and Woodruff（1999）は、同じく移行経済であるベトナムで、新規
参入者である民営企業が取引をどのように統治しようとしていたのかをサーベイを行い分
析している。Johnson, McMillan and Woodruff（2002）は、ロシアおよび東欧の移行経済国を
対象にサーベイを行い、経済取引の統治（governance）、執行（enforcement）において、通
常理論分析が履行者として想定している裁判所がはたして機能をしているのかを確認して

いる。こうした実証分析に刺激を受け、理論分析も多く現れた。Dixit（2003a）（2003b）（2009）などの一連の理論分析では、契約の執行、取引の統治が当事者間のインセンティブの設計で機能する範囲は狭く、第三者や制度によって取引の安全が担保されると、経済取引の全体の規模が拡大することを論証している。詳しい研究動向は、各章の文献レビューに譲るが、ごく最近でも、Klapper, Laeven and Rajan（2011）のように、企業間信用契約の詳しい取引条件にフォーカスした記述的な実証論文が発表されているように、この分野の研究はまだ発展途上であると言える。以下では、簡単に本学位請求論文を構成する各論の内容を紹介する。

　本研究の論文（１）は、そもそも企業間の取引において、どのような条件のもとで企業間信用が提供されるのか、他のメカニズムとの関係はどうなっているのかを分析することを目指した。McMillan and Woodruff（1999）を初め多くの先行する実証研究は、企業の売掛金の残高などを企業間信用と定義し、分析を行っている。しかし、これは取引そのものの構造を明らかにはしていない。このため、筆者たちは、企業がおこなっている取引のうち、特定の相手との取引を特定し、販売額、与信額、その他の取引条件および取引相手の属性などを記述してもらう形のサーベイを行った。個別の取引そのものの情報をサンプルとして集めたため、ごくミクロの状況を把握することができる。このデータの記述統計を検討している中で、売り手と買い手の関係をみると、売り手の「交渉力」と「回収を履行させる力」と、企業間の与信決定との間には違いがあることがわかった。具体的には、売り手の「交渉力」が高いと企業間信用の比率は低いが、売り手の「回収履行能力」が高いと企業間信用の比率は高かった。この発見をもとに、買い手が未払いを起こすことができ、買い手には資金制約がある環境のもとで、売り手と買い手が取引の規模、そして企業間信用の規模をどのように決めるかを理論的に考察した。その上で、上述のデータを用いて、実証的に確認する作業を行った。この結果、「交渉力」の高い売り手はデフォルトリスクを回避するため、事前の取引を通じて取引規模と与信規模を小さくしようとする一方、交渉力の高さは事後的な「回収履行確率」も引き上げる効果を持っていた。全体として交渉力の高さは、取引を小さくする効果のほうが高いことが確認された。この結果、企業間の取引において売り手の地位向上を闇雲に確保するよりも、制度を通じて事後的な「回収履行確率」を引き上げる政策の効果が経済取引の効率化には効果があることが確認できた。また、買い手の資金制約を緩和することは、売り手の「回収履行確率」を引き上げるのと同じ効果を持つことも確認できた。つまり、経済全体から見た場合、現金の残高と代金回収の履行確率は代替的な関係にある。このため、代金回収に関するメカニズムが混乱していた移行経済では現金の需要が大きく、十分な現金の供給が行われれば、代金回収メカニズムが混乱していたとしても、経済活動の拡大が可能であったことがわかった。

　また、現金だけでなく競争も制度を補完する効果を持っている。中国では、1990 年代の

半ばに政府は関連法規など制度を導入したものの、企業間取引が混乱する事態は、その後2000年代前半までほぼ10年にわたって続いていた。結局のところ、法制度の導入だけでは十分に機能せず、企業間で取引メカニズムを再構築していくことで初めて、代金の支払いの履行がスムーズに行われるようになったのである。筆者は、テレビやエアコンを生産する家電企業において、この代金回収リスクという問題にどのように対応したのか、について、聞き取り調査を行った。そこで筆者が目にしたのは、多くのメーカーが代金回収リスクを回避するために、さまざまな流通のしくみを考えだし、よりよい取引メカニズムの構築を目指して試行錯誤を重ねる姿であった。本研究の論文（２）では、代金回収リスクの回避のために企業が取った戦略をモデル化し、それぞれの戦略が競争した結果、市場にどのような均衡が現れるかを観察した。この結果、代金回収のリスクという問題に関しては、スポット取引や内部化で対応しようとするよりも、あるタイプの契約取引を結ぶことで、小売価格が最も安く、かつ販売数量ももっとも多い、社会厚生が最大化する状況を生み出すということが確認された。この理論的分析は、２つの契約取引は、最もコストを引き下げ、安い小売価格をもたらすことを予言している。これは、企業間の競争を通じて現れてくる均衡であるため、この動きを実証的に確認するにあたっては産業組織論的アプローチを用いた。需要と供給をそれぞれ構造化する推定方法を用い、企業の価格（供給）戦略に関して、契約を用いた販売メカニズムがコストを引き下げ、安い小売価格を実現していることが確認することができた。

　企業間の交渉で決定される企業間信用が、法などの制度の影響を受けにくいという、という性質は、株式市場における上場企業の規律を侵犯する手段ともなっていた。企業統治制度は、経営者のインセンティブを適切にコントロールすることで（外部）投資家の利益を守ることを目指している。この企業への規律づけの抜け穴として、経営者や支配株主が資源を私的に流用する手段として使われた。本来一株一議決権の株式のみが存在する場合、支配株主の意志決定は少数株主へも利益を公平に分配する効果をもつため、支配株主による私的利益の流用は起こらないと考えられている。しかし、議決権がないもしくは制限された株式と一株一議決権の株式が併存している（dual class share）、持ち株会社が何重にも垂直投資して上場会社を支配している（pyramiding）などの構造が存在している場合、支配株主が少数株主の利益を侵害することが可能になることが指摘されている。中国においては、この異質な株式の併存とピラミッド化の両方が起きていた。会社法上は一株一議決権のみが認められているが、市場経済への移行過程の経過措置として、流通を認められるが事実上非常に小さな割合での保有しか認められず、議決権のない株とブロックでの保有が認められる議決権が併存する状態が、2006年の株式制度改革まで続いていた。また、上場企業の多くがピラミッド構造を持っており、上場企業全体の8割の企業の最終的な支配株主が中央・地方の政府であり、「国有上場企業」となっている。こうした上場企業の支配株主が、子会社である上場企業の資源を利用するときには、すべて情報を開示せねばなら

ず、通常の配当支払いは公平に行わなければならない。しかし、企業間信用を用いて、支配株主が上場企業の資源を私的に流用することも可能であった。上場企業から関連会社への企業間信用、売掛金の残高を拡大させ、持ち株会社が私的な資源流用の支払いを行うかたちにする。この流用が起きている場合には、この売掛金の残高が過大に増え、過剰投資を行っていることになる。本研究の論文（３）では、中国の上場企業のデータを用い、以上の関係が存在するのかを確認する実証分析をおこなった。ここでは、次のような結果が確認された。まず、①支配株主が中央・地方の政府の場合、この売掛金の残高をふくらませて過剰投資を行っている企業は存在している。②支配株主が個人などの民営企業の場合、過剰投資は見られなかった。制度改正によって異質な株式の併存状態は解消されたものの、以上の分析からピラミッド化した企業統治制度のもと、企業間信用を通じた資源の流用が確認されており、株式市場のゆがみは完全に解消されたとはいえない。

　本学位請求論文の研究は、企業間信用を事例とし、経済主体の具体的な行動と制度の関係を明示しながら、検討したものである。全体を総括すると、企業間の取引を効率的なものにするためには、二者間の交渉には限界があり、第三者や制度による契約履行の力が重要であることは間違いない。しかし、現金が十分に供給されているとき経済全体の信用は小さくなるものの、経済の取引規模を一定の水準に保つことはできる。また企業間で競争があるとき、競争を通じてより効率的な取引メカニズムを企業が選択していく効果も確認できる。いたずらに契約履行の強制力を外生的に強めるのではなく、競争による効果も考慮して、制度の設計を行うほうが効率的であることを示唆している。また、企業が経済的な効率性を追求するような企業統治制度ができていないとき、やはり資源配分の非効率性が発生する。現金や競争がある程度制度の持つ力を補完することはあるものの、やはりよい制度が整備されて初めて、経済全体の効率性が向上することを確認することができた。

Introduction

to

Empirical Essays on
Emergence of Economic Transaction Mechanisms:
Case of Trade Credit in China *

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1 Motivation

This thesis is motivated to analyzes how the rules of economic transaction had emerged and implemented by referring to experiences in transitional period's China as example. It is widely accepted and convincing to argue that institution is important and substantial factor for economic growth and economic development. However, it is usually hard to observed what actually will happen if the institution thoroughly collapsed and economic transactions are forced to operate in this environment. In the 1990s to early 2000s of China, whole economic system transformed from the planned economy to market economy, where old institution did not work, but new institutions were not emerged yet. A vacuum of institution did appeared but economic transaction existed and operated. This thesis is motivated to describe and analyze how economic transaction were emerged and implemented in this very special experimental situation.

2 Background

2.1 Transformation of resource allocation system in transition era

Institution that support economic transaction in China drastically transformed since the reform and open door policy initiated: from a system that support government to uniformly plan, to a system that are friendly to market adjustment of resource. The transformation can be describe as from "fiscal resource allocation" to "adjustment via financial system"(Watanabe, S., 2006). This conceptualization implies that planned economy is a system that government allocate financial resources under their planning, whereas market economy is a system that financial resources are allocated via decentralized market transaction. "Fiscal allocation" may suffer from failure of government, mostly because government cannot obtain fully effective information to facilitate the allocation or government may have irrational motives on decision of allocation. On the other hand, market adjustment may suffer from market failure, which is also due to information asymmetry between market player. The institution is regarded to matter to support to overcome market failure.

2.2 Why trade credit?

Then, what is necessary feature of good financial market? What kind of factor matters to evaluate goodness of institution? In order to consider this problem, it is helpful to see what is the function of financial system. In order to understand how financial market works, Merton and Bodie(2005) and Crane et.al(2001) proposed to focus on function of financial system, but not on institution or organization. They classified functions that financial market play as follows:

(1) to provide ways of *clearing* and *settling payments* to facilitate trade.

(2) to provide a mechanism for the *pooling of resources* and for the *subdividing* of shares in various enterprises.

(3) To provide ways of *transfer economic resources* through time, across borders, and among industries.

(4) To provide ways of *managing risk.*

(5) To provide *price information* to help coordinate decentralized decision-making in various sectors of the economy.

(6) To provide ways of *dealing with incentive problems* created when one party to a transaction has information that the other party does not or when one party acts as agent for another (Merton and Bodie(2000)).

These functions are conveyed by transaction contract between two parties, various institution or organizations. To understand how these functions worked, interacting institution, organization and transaction, this thesis take trade credit as a case to study in detail. Trade credit is a finance given between buyer and seller. Mostly seller gives credit to buyer when he sells products, awaiting to be paid for a while. Whether this credit is repaid or not depends on negotiation/agreement/contents of contract between the two parties and enforcement by institution/the third party. In most of economies, repayment is guaranteed by customs that regulate two parties' negotiation, or some institutional arrangement. However in China during transition era, both customs and institutions for payment got vacuum. The society needed to reconstruct mechanisms. Thanks to this "experimental" situation, we were able to observe a process of emerging mechanisms of economic transaction. This is what this

thesis treated.

Trade credit is an interesting topic of research, because it is a joint between two-parties negotiation and third party's enforcement/institution, also a joint of product market and financial market; besides a joint between internal finance and external finance, debt from financial institution or equity market. The first paper discusses that risk cost point and transaction and trade credit sizes (related to function (1) (3) and (4)). The second paper discuss that how incentive problem is mitigated by contract design, which is related to function (1), (6) and (4), and how competition can substitute governance. The third paper addresses incentive problems of owner and trade credit (the function (6) and (3) are related).

Detailed literature reviews are developed in each chapter, but here I would like to mention that research on the trade credit mechanism is still developing: one example is Klapper, Laeven and Rajan(2011) that documents a micro descriptive data. Particularly, researches with theoretical model and empirical test are very limited, where this thesis challenged.

2.3 History of institutional transformation

Because all the papers treated experiences of China, here, we overview historical development of institutional transformation of China related to finance and enforcement. Table 1 shows a brief historical development of institutional reform related to financial market and corporation. Decision right of management of state owned enterprises (SOEs) were given form the government to the firm step by step. Laws that regulate economic transaction and financial transaction were introduced; substantial important legislation was compete around 2005. Three papers in this thesis mainly discuss the situation around the middle of 2000s: transitional period between independent era to complete era.

3 Perspectives, Approaches and Findings

Perspectives and approaches taken here are diversified, though all the papers focusing on trade credit. The trade credit are analyzed from the following three perspectives:
The first paper formalizes a negotiation between two parties on transaction and trade credit. This paper approaches trade credit as a problem of two parties' negotiation on transaction

Table 1: Institutional Transformation

	Year	Financial system	Corporate Sector
Planned Era	1978	Monobank (Unified into one bank)	Fully subsidized
Subcontracting Era	1984	Two-tier bank	Convert subsidy into debt(1985) Partial autonomy of SOE's management(1985) Subcontracting btwn government and SOE(1987) Village and county enterprises formalized(1987)
Independent Era	1992	Stock exchange(1991) Short Money market (1996) Commercial Bill Law(1996) Code of Civil procedure(1996)	Corporate system(1993) Private enterprises formalized(1994) formalized(1994)
Complete Era	2005	Corporatisation of state bank(2005) Revised Security Law(2005) Revised Bankruptcy Law(2007) Law of Realty(2007)	Revised Corporate Law(2005) Unifying classified equities(2005) Competition Law(2007)

Source Author.

volume and trade credit where strategic default is feasible for buyer and cash constraint may matters. Then, empirically tested based on the surveyed data from small and medium enterprises in China.

The theoretical model explicitly formalized and showed different impacts of bargaining power and enforcement power of seller to determine transaction and trade credit sizes. Stronger bargaining power of seller reduces transaction size and trade credit ex ante, enforcement power enhanced transaction sizes and trade credit ex post. Empirical test support this relationship. An interesting finding from empirical work is that bargaining power also has power to enhance enforcement power, but its impact is smaller than ex ante reducing power. This result implies that in a presence of strategic default, negotiation between two parties is not efficient in terms of size of realized transaction. Though the two parties'

negotiation works to support economic transaction, but its impact is limited and the third parties' enforcement is necessary for the economy to grow out of a certain critical size.

The second paper took a more reductive approach compared to the first paper. It formalizes several types of sales contract format, that were actually observed in the home appliances industry, and consider the effect of competition of sales mechanisms each other. Theoretical formalization of actual sales mechanisms reveals that two types of contract mechanism are superior in terms of efficiency in social welfare to spot transaction and integration. The former two contract mechanisms can realizes lower retail price and larger selling volume than spot transaction and integration. Empirical studies to test this hypothesis, I employ an empirical industrial organizational approach because theory predicts that different mechanisms brings bout different price and cost levels. Empirical results shows a consistent result with theoretical prediction. Rebate contract on volume with prepayment can realizes the lowest cost and price in a presence of strategic default.

The third paper treated a slightly different aspect of trade credit; trade credit is used as conveyer of expropriation from listed company. Failed governance allows the owner of listed company, who are the state sector not private sector, to expropriate resources of minority shareholders. A very basic model discusses that no conflict of interests between a controlling shareholder and minority shareholders because target of both are identical. However, recent corporate governance literature discusses that under "particular structures" and allow non-monetary private benefit exists, conflicts of interest between a controlling shareholders and minority shareholders emerges, excess investment for controlling owners may take place. The particular structures refers to "dual class shares", i.e., shares with decision right and that without decision right, and "pyramiding", i.e., vertically invested corporate structures. In China, due to historical reason, both structures remained until 2006 when "dual class shares", the former structure, started to abolish. Empirical works identify that excess investment takes place for state-owned enterprises and it still remained even after all the shares become homogenous because pyramiding structure still remains.

4   Conclusion

Three papers here discussed interaction of behavior of micro agent and institutions focusing on trade credit. The first papers revealed that trade credit may be given and transaction may be realized via negotiation between buyer and seller. But, its size may shrink when seller has bargaining power, because seller want to avoid strategic default, and exercises its bargaining power to shrink its sizes and credit. Although if buyer is cash rich, the size of economic transaction maintains a certain level, but it is more desirable that institution or the third party guarantees to enhance ex post enforcement power over payment contract to realizes more efficient situation. The second paper shows that not only cash, but also competition has power to substitute institutions to govern economic trade to some extent. The paper documented that a contract that can manage default risk can also reduce total cost of the buyer-seller pair and it led to lowest retail prices. This process force the firms to select more efficient sale mechanisms.Here, I can claim institution matters, though cash and competition can substitute to some extent. However, institution in the financial market is still necessary to realize efficient transaction, because poor corporate governance in the financial market allow them to waste economic resources. Here, I can claim that though cash and competition can substitute with institution to some extent in the product market, but still institution seriously matters, particularly in the financial market.

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Chapter 1
Ex Ante Bargaining and Ex Post Enforcement
in Trade Credit Supply:
Theory and Evidence from China[*]

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Abstract

If payment of goods is easily default, economic transaction may deeply suffer from the risk. This risky environment formed a mechanism that governs how economic transaction is realized, subsequently how trade credit is given. This paper claims that by distinguishing ex ante bargaining and ex post enforcement, bargaining power reduces trade credit ex ante, and ex post enforcement power and cash in hand of buyer can enhances both trade amount and trade credit. What this paper did are as follows: first, we did theoretically and empirically distinguish the factors that govern trade mechanism as ex ante bargaining and ex post enforcement power based on findings of our original micro data on detailed transaction in China. Secondly, in order to organize findings from literatures and our data to understand the mechanism consistently, we did a theorizing. Thirdly, empirically tested a structure from the theoretical prediction with data. Result shows that ex post enforcement power of seller mainly determines size of trade credit and trade amount, cash in hand of buyer can substitute with enforcement power; Bargaining power of seller is exercised to reduces trade credit and trade amount for avoiding default risk, but it simultaneously improves enforcement power as well. We found that ex post enforcement power consists of (ex ante) bargaining power on between two parties and intervention from the third party. However, its magnitude is far smaller than the direct impact to reduce trade credit and trade amount.

Keywords: trade credit, enforcement, bargaining, cash constraint, competition in product market
JEL Classification Number: O5, K0, G2, P31, E41.

1 Introduction

1.1 What mechanism governs transaction with trade credit?

In real world, trade credit is an important facility to realize economic transactions. Recently both empirical and theoretical research have tried to unveil a mechanism on how trade credit is supplied, and how it contributes to economic growth. This research distinguished bargaining power and enforcement power as different factors that govern transaction contract with trade credit. This perspective is necessary to answer several puzzles in the related literatures. First, law and economics literature claims that high economic growth is accomplished by the economy with good enforcement institutions. But the literature did not demonstrate a micro structure behind the relationship. Not only to this limit, but also the real world give a counter-fact against the claim. China, whose enforcement institution is considered to be poor and biased, has kept rapid and drastic economic growth since the 1990s to the 2000s. In addition to this big puzzle from the real world, recent empirical works present another puzzle. They found a fact that bargaining power and trade credit ratio in a transaction are negatively correlated. This is puzzling as it runs against the intuition that a supplier with stronger monopolistic power should be able to exercise the power to enforce a buyer repayment.

1.2 Summary of Findings

First, a contribution of this paper is to be able to empirically distinguish factor the enforcement power that determines transaction and trade credit in survey data. This is unique because preceding empirical literature did not distinguish bargaining power and enforcement power. But, our original survey has information on experience of default in trade credit and contents of the trade default. The survey allow us to observe the exact profile of transaction, then allow us to identify the factors of enforcement power and bargaining power for exact transaction between exact seller and buyer.

Secondly, facts found in this survey are as follows: (1) Trade credit is not a negligible instrument for firms to facilitate transactions. For a substantial share of firms, the cash stock in the hand of the buyer is much smaller than the size of a transaction with his partners (Table 1). Furthermore, (2) trade credit is given by the seller who has weaker bargaining power. This result is robust even after necessary remedy to econometric endogeneity prob-

lem. On the other hand, however, (3) monopolistic suppliers do not necessarily request cash payment. A monopolistic supplier sells the non-negligible share of his products 100 per cent on credit (Figure 1).

Figure 1 shows distribution of trade credit ratio by the number of competitors. Density of zero trade credit is the highest for the monopolist supplier. However, it is a very interesting fact that density of full trade credit ratio is also as much high as zero trade credit for the monopolist supplier. We can see here that monopoly power is utilized for two polar cases: zero trade credit or full credit. This means that "bargaining power" between seller and buyer is important but cannot fully explain how trade credit is given. "Enforcement power" is also important for trade credit supply mechanism, and also has a "non-linear" nature. If the seller offers some trade credit, his trade credit ratio increase along with his enforcement power. However, if the seller offers zero trade credit, his enforcement power can be interpreted as the maximum as well. Because he has power to enforce payment in whole cash, and remained no credit. The non-linear relationship between competitive environment and trade credit provision could be complementally explained by the enforcement power of seller and the cash holdings of the buyer.

Thirdly, theoretical attempt to organize the facts above found following relationships: When default of payment is expected, seller will exercise his bargaining power to reduce credit to buyer to avoid the default risk. In this situation, bargaining power is correlated with enforcement power. Here, trade credit supply is determined not only by enforcement power but also by ex ante bargaining power of the seller. In addition to ex ant bargaining and ex post enforcement powers, cash constraint of the buyer is also the essential factor to determine transaction and trade credit size. If cash in hand of buyer is sufficiently large, transaction will be realized even under poor enforcement environment.

As a whole, the mechanism of governing trade credit supply is different from ordinary debt contract in the following sense. An ordinary debt contract is determined by profitability and risk of a project. But trade credit is also determined by bargaining power of the seller or position in the product market competition, in addition to risk/enforcement probability of contract and profitability of project or the trade. Hence, trade credit has an inter-linked nature as a joint of financial market and product market.

Finding of the interlinked nature is consistent with a theoretical prediction of Dixit

(2003a, 2003b, 2009): trade can be implemented by negotiation with two party to some extent, but it needs the third party's enforcement to support economic transaction when it outgrows a critical size.

Fifth, empirical study here supported the structure from theoretical prediction. It is clear from the comparison between reduced form regression to structural estimation that bargaining power and enforcement power shows substantial explanatory power on trade amount and trade credit.

Finally, because of the structural relationship between product market competition, risk and trade size with trade credit presented here, policy simulation or experimental study on institutional arrangement and economic activity become feasible. This paper attempted a policy simulation on the impact of improved enforcement institution on economic transaction size.

Table 1: Cash in hand of firm and Size of Transaction

Cash/Transaction size	N	Min	Mean	Max
with supplier				
Cash stock < transaction size with a supplier	615	0.0001	0.28	1
Cash stock >= transaction size with a supplier	219	1	127	9,155
with customer				
Cash stock < transaction size with a customer	643	0.0004	0.23	1
Cash stock >= transaction size with a customer	177	1	234	18,708

Source: IDE-DRC survey and JICA survey.

1.3 Literature

The literature on trade credit started by exploring the determinants of usage of trade credit compared to other financing channels. The first comprehensive survey of theories and empirical tests on trade credit is done by Petersen and Rajan (1997). It used the SME data in the United States, then found that suppliers are inclined to lend to financially constrained customers. Their survey extended various possible theories to explain why the trade credit is given. They interpreted this is because suppliers have advantages in getting information on buyers, and firms with better access to information offer more trade credit. Mian and Smith (1992), and Ng, Smith and Smith (1999) explored how payment contracts are determined amongst a choice of net trade credit supply, cash payment, or two-part

Figure 1: Trade Credit Ratio and Number of Competitor
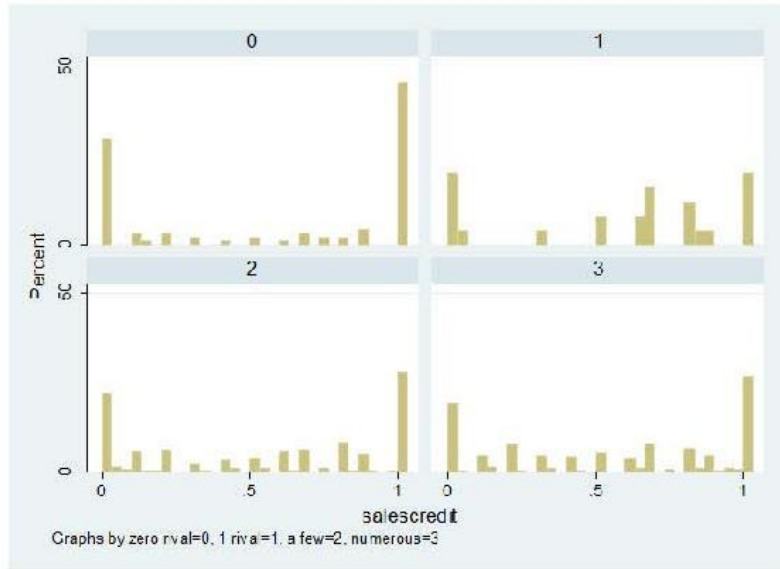
payment, based on a survey of 2538 firms drawn from COMPUSTAT files in the United States. The result showed that the more the number of customers, i.e., the bargaining power of the seller/lender is stronger, they receives more credit. Or when the seller firm is an OEM manufacture or wholesaler, that firm will offer credit to its customers.

Focus of the research began shifting to trade credit in developing or transition economies, where presumably the institutional enforcement mechanism works poorly, following the availability of firm-level data improved. Demirguc-Kunt and Maksimmovic (2001), Fisman and Love (2003), Allen et al. (2004) showed that trade credit is a substantial source of financing and a substitute for bank credit for small and medium-sized firms. Fafchamp (1996, 1997) and MacMillan and Woorduff (1999) tried to capture how the enforcement mechanism of trade credit; the former documented ethnic relationship mattered. Theoretical works also start to focus on enforcement and economic transactions. Dixit (2003a; 2003b; 2009), for example, demonstrated economic transactions can be realized even the two party's negotiation, but it may expand beyond a critical point if enforcement of contracts or supervision of transactions are guaranteed by a third party or under an institutional system.

The theoretical literature expanded into two directions: a financial motivation approach and product market competition approach. The former has explored the motives of the "lender" and "borrower" of trade credit compared to other financial sources. It has focused on the problem of why a lender gives credit to a buyer, and why a buyer chose to "borrow" trade credit instead of some other financial instrument. This approach implicitly assumes that financial motivation leads to trade credit provision. Bukart and Ellingsen (2004) theorized that trade credit and bank loans can be both complements and substitutes, and presented a model for entrepreneurs to choose bank loans or trade credit. Fabbri and Menichini (2009) theorized that informational advantages of the supplier to other financing sources allows them to provide credit. Cunat (2007) set up a model to show that the supplier has a comparative advantage over banks in lending under limited enforceability of contracts, and the supplier also acts as a lender of last resort. Petersen and Rajan (1995) focused on competition in credit market, not on product competition as this paper.

The other strand of literature discussed the impact of product-market competition on trade credit provision. This approach sheds light on impact of competition in the product market that leads to trade credit provision. Their results were conflicting each other at early stage. Regarding the relationship between competition and trade credit provision, MacMillan and Woodruff (1999) indicated that the presence and number of competitors within a 1-km area lowers trade credit provision to customers. Johnson, MacMillan and Woodruff (2002) also showed that trade credit provision is lowered when there exists more than 5 rivals within 1 km. Their results show that competition prevents suppliers from giving credit so as to avoid risk. However, their survey design might have failed to capture a full picture of competition, as they limited their information to survey to within a very limited area.

Subsequent studies found an opposite result from the above: the less monopolistic the supplier, the more trade credit is given to the buyers. Fisman and Raturi (2004) showed that the monopoly power of the supplier is negatively associated with credit provision, which countered the assertions of previous studies who claims monopoly power facilitated the provision of credit because monopolists are better able to enforce payment. Fabbri and Klapper (2008) documented that (1) the stronger bargaining power of the buyer (borrower), the more trade credit offered, and (2) period matching between trade credit received and

offered exists. The more trade credit received, the larger trade credit a firm will extend. At the same time, (3) access to bank financing and profitability is irrelevant to trade credit provision based on a 2003 World Bank Enterprise Survey in China. Van Horen (2007) also documented that market power of buyer is strongly correlated with trade credit provision based on data of Eastern Europe and Central Asia. They dicussed that buyer can extract surplus by demanding to buy goods on credit. Van Horen (2007) argues that this gain in customer surplus increases with asymmetric information on product quality that the seller knows but buyer might not. Hyndman and Serio (2009) showed that the relationship between trade credit provision and supplier's market power is not linear but inverted-U shaped. A monopolist supplier often prefers to sell on cash only, which is zero trade credit. Once competition starts, trade credit grows with the number of competitors. Hyndman and Serio (2009) argued that this happens as Bertrand price competition in the cash market pushes up the price of cash, i.e., payment in cash to marginal costs, thus new entrants can only offer trade credit given the product market competition. With the intensification of competition, problems of commitment on trade credit repayment and decisions on credit provision become irrelevant. However, enforcement becomes constrained as the number of competitors increases and outgrows a certain limit. Recent empirical investigation using micro data reports following phenomenon: trade credit is given by less monopolistic supplier to more monopolistic buyer. However, there is no common agreement on the mechanism behind this phenomenon. This paper also tries to explain the phenomenon.

This paper goes as follows: Section 2 describes our original data and shows findings from its descriptive data. Section 3 set theoretical model on trade credit supply and trade volume decision in the presence of strategic default. Section 4 shows estimation and identification strategy. Section 5 discuss the results and Section 6 conclude the paper.

6

2 Data and descriptive statistics

2.1 Data Source

The data we used in this paper was obtained from two surveys based on a structurally very similar questionnaire[1]. The questionnaire was designed to capture information on characteristics of transactions between firms and related enforcement mechanism (See Figure 2). In order to obtain effective variances in the sample, the surveyed firms were asked to provide the information on transactions with following four types of transaction partners: (1) a customer who is located inside the home city of the surveyed firm; (2) a customer who is outside the home city of the surveyed firm; (3) a supplier who is located inside the home city of the surveyed firm; and (4) a supplier who is outside the home town of the surveyed firm. The survey was designed to sample transactions both inside and outside of the hometown.

To understand mechanism to determine transaction with trade credit provision, we are concerned with the ex post enforcement power of the trade credit contract in addition to the bargaining power that the literature has been concerned with so far. We regarded that enforcement is implemented through several timings. The first step is commitment between two parties. The two parties may offer mechanisms and negotiate to enforce the contract according to their bargaining power. However, the commitment may not work under some situation, and intervention by a third party, the second-step mechanism, become necessary. Usually, a court is regarded as the third party enforcer. However, in China, the lack of a legal enforcement mechanism has been criticized. Hence, we regard here the power of the government or administrative entity as an arbitrary substituting for the law. Cluster sampling both from inside and outside of the hometown allows us to capture differences in enforcement impact across and inside of administrative borders.

The data consists of responses from a total of 638 firms with a maximum of four samples for each. The sampled firms were 465 private enterprises, 124 government enterprises, and

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[1]The first survey was administrated in Yibin City, Sichuan Province, in January 2003 by the Development Research Center and Institute of Developing Economies (DRC-IDE Survey). The second was administered by the People's Bank of China (PBOC) and commissioned by the Japan International Cooperation Agency in Beijing City, Dongguan City in Guangdong Province and Xi'an City in Shaanxi Province in December 2003 (PBOC-JICA Survey). The two surveys were implemented using very similarly structured questionnaires in the sections concerning inter-firm transactions, and we were therefore able to pool the two surveys for this paper to analyze firms' trade credit behavior.

49 FDI firms (Table2). These firms were randomly sampled from lists of firms that were supervised by the local branches of the People's Bank of China in Beijing, Xi'an, and Dongguang, and the Yibin City Government[2].

Figure 2: Structure of Information in the Survey

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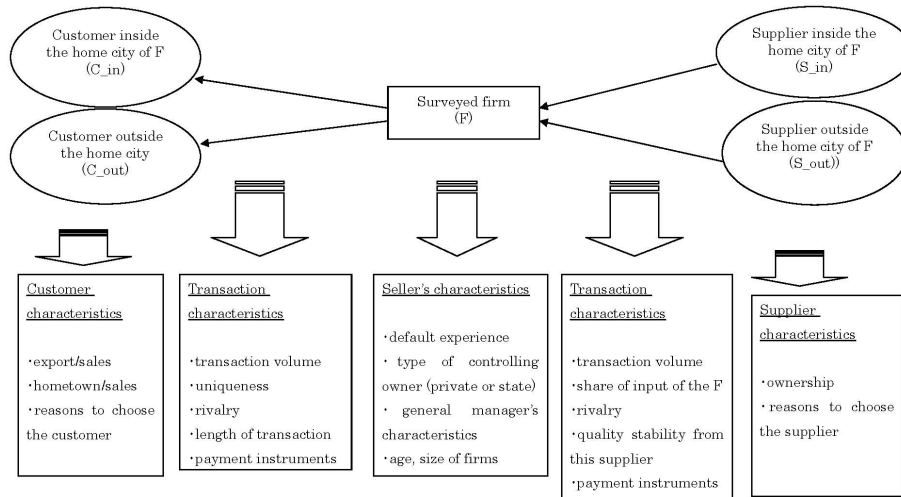
[2]The sample selection mechanisms were as follows: For the DRC-IDE Survey at Yibin, the surveyed firms were selected mainly based on tax and dividend payment lists held by the commercial and economic department of the Yibin City Government. In the case of Yibin, the sampled firms covered around half of the firms in the city, and we were therefore able to regard it as more or less the same as a city census. For the PBOC-JICA Survey, the respective branches of the PBOC kept ledgers, called the Daikuanzheng (Qualification for Loan Application), on the transactions of all bank branches with local firms. The sample firms here were primarily selected based on the list of "Qualification for Loan Application" holders, but this list contained a substantial share of inactive firms, so if we had sampled directly from this list we would have had an extremely low survey collection rate. Therefore, we also sampled firms based on lists held by the commercial and industrial departments of the respective local governments, which was similar to what we did in Yibin City.

Table 2: Location and Ownership of Surveyed Firms

Ownership type	Beijing	Dongguang	Xi'an	Yibin	Total
Number of firms					
FDI	26	7	16	0	49
G	41	8	56	19	124
P	133	91	150	91	465
Total	200	106	222	110	638

Source: IDE-DRC survey and JICA survey.

2.2 Data Description

We are interested in the micro structure of how transaction with trade credit is determined via negotiation between firms. In order to closely look at the firm's decision mechanism, we collected information on the characteristics of transactions between particular transaction partners. After defining the variables, descriptive data will show the relationship between trade credit, the enforcement power to repaid, and the bargaining power between buyer and seller.

2.2.1 Description of Main Variables

Dependent variables of our model and estimation are trade credit ratio and transaction amount. In our survey we asked firms to pick up particular trading partner, and then to describe the annual value of transaction with them, ratios of prepayment, cash on delivery and payment after delivery (the sum of this three items being 100%). We define trade credit ratio as a ratio of payment after delivery, transaction amount as the value of a transaction, and trade credit volume as trade credit ratio multiplied by transaction amount.

The essential independent variables here are bargaining power, enforcement power and cash stock. We use two variables from the survey as bargaining power variables: the presence of potential rivals dummy and importance of seller to the buyer (evaluation by seller himself). Table 3 shows descriptive statistics of bargaining power variables.

The second essential independent variables is enforcement power index. This is an index

calculated by following steps.The survey also collected information on experiences of trade credit default. The surveyed firms were asked whether in the four years prior to the survey, the trade credit they had provided was; (1) repaid on time, (2) had payment delayed, but was eventually repaid, (3) was completely defaulted. Table 4 shows distribution of firm who ever been default. Here, FDI firms are the lowest in terms of the ratio of firm having experienced defaults on trade credit (0.20 at mean. The difference is statistically significant compared with government owned firms (0.3111 at mean) and privately owned firms (0.264 at mean). Based on this default experience data, we calculated the enforcement probability, defined it as the enforcement power index in this paper. That is, the enforcement power is indexed by the predicted values of the trinomial (i.e., repaid, delayed and default) probit estimators. Enforcement probability of the supplier in the surveyed firm-and-customer (F to C) relationship is obtained directly from the trinomial probit. The enforcement probability of supplier in the surveyed firm-supplier (S to F) relationship is obtained by out-sample projection using the estimates of the F to C relation ship.). Table 5 shows results of trinomial probit estimates by based on which the enforcement power index is calculated. Table 6 shows summary statistics of main variables.

Table 3: Bargaining Power of Supplier by ownership types

Monopoly Power of Supplier	Min	Med	Mean	S.E.	Max	N
S to F :share among all inputs of the buyer						
Foreigner Owned	0.035	0.3	0.395	0.026	1	105
Government Owned	0.01	0.31	0.406	0.016	1	321
Private Owned	0	0.3	0.353	0.014	1	393
Total	0	0.3	0.380	0.010	1	819
F to C: if goods designed for buyer=1, no=0						
Foreigner Owned	0	0	0.460	0.063	1	63
Government Owned	0	0	0.358	0.036	1	179
Private Owned	0	0	0.381	0.018	1	689
Total	0	0	0.382	0.016	1	931

Potential Rival	Min	Med	Mean	S.E.	Max	N
S to F : if rival exists=1, no=0						
Foreigner Owned	0	1	0.721	0.044	1	105
Government Owned	0	1	0.805	0.022	1	321
Private Owned	0	1	0.933	0.013	1	393
Total	0	1	0.855	0.012	1	819
F to C: if rival is zero=0, one =1, a few=1, numerous=3						
Foreigner Owned	0	2	2.03	0.094	3	63
Government Owned	0	3	2.17	0.080	3	179
Private Owned	0	2	2.26	0.033	3	689
Total	0	0	2.23	0.023	3	931

Source: IDE-DRC survey and JICA survey.

Table 4: Default Experience of Trade Credit by Ownership Types

Ownership type	Min	Median	Max	Mean	S.E.	Total
Ever default=1, No=0						
Foreigner Owned	0	0	1	0.200	0.060	45
Government Owned	0	0	1	0.311	0.042	122
Private Owned	0	0	1	0.263	0.021	449
Total	0	0	1	0.267	0.018	616

Source: IDE-DRC survey and JICA survey.

Note: T test on equality of mean default experience between Foreigner and Government owned firm is weakly rejected. Foreigner's mean default probability is lower than Government owned firm by 11.1 per cent point, t-value is -1.5158. The same test between Foreigner's and private owned firm was not rejected. Mean difference is 6.3 per cent point, t-value is 0.9846.

Table 5: Estimates of Enforcement Power Probability

Dependent variables	Repaid		Delayed		Default	
	Coef.	(S.E.)	Coef.	(S.E.)	Coef.	(S.E.)
Competitiveness						
Product is unique (if yes 1, otherwise 0)	0.00	(0.13)	0.04	(0.11)	-0.07	(0.09)
Number of rival	-0.58	(0.26)**	0.20	(0.26)	0.40	(0.17)**
Administrative region dummy						
Dongguan	0.09	(0.20)	-0.16	(0.17)	-0.09	(0.13)
Beijing	-0.04	(0.24)	-0.30	(0.20)	0.39	(0.16)**
Xian	0.13	(0.22)	-0.13	(0.18)	-0.03	(0.15)
Governance factors						
Private owned	0.10	(0.18)	-0.01	(0.16)	-0.16	(0.12)
State owned	0.15	(0.19)	-0.33	(0.17)**	0.18	(0.16)
Government solves disputes	0.01	(0.14)	0.18	(0.12)	-0.22	(0.10)*
Government supply information	-0.03	(0.13)	0.01	(0.11)	0.01	(0.09)
Government help talk with bank	-0.07	(0.14)	0.21	(0.13)*	0.05	(0.10)
Government supply human resources	0.11	(0.24)	0.29	(0.21)	-0.46	(0.20)**
In-house CEO	-0.10	(0.60)	-0.32	(0.60)	0.71	(0.76)
CEO from government	0.04	(0.63)	-0.41	(0.62)	0.60	(0.75)
Year of CEO in his/her position	4.66	(21.7)	31.1	(18.3)*	-31.6	(15.5)**
a *Basic profile of firm*						
Total annual sales(log)	0.02	(0.04)	0.35	(0.03)	-0.02	(0.03)
Established year of the firm	18.14	(14.9)	-18.21	(11.8)	7.34	(10.58)
Constant	0.25	(0.72)	0.04	(0.69)	-1.62	(0.79)**
Log likelihood	-1280.12					
Number of observation	903					

Source: IDE-DRC survey and JICA survey.

Note:* p<0.1; ** p<0.05; *** p<0.01

2.2.2 Graph

To capture relationship between the dependent, trade credit and trade amount, and the independent variables, bargaining power and enforcement power of the seller and cash amount of the buyer, we first take a graphical look. First, Figure 3 plots enforcement power (probability of non default) against trade credit and trade amount shows some relationship. Trade amount looks increasing to enforcement power, but correlation between trade credit ratio and enforcement power looks ambiguous. Secondly, Figure 4 plots bargaining power (ratio

Table 6: Summary of Main Variables

Variables	N	Mean	Std. Err.	Min	Max
Dependent Variables					
Size of transaction (0000RMB)	946	1,481	4,067	1	80,000
Ratio of post-payment	905	0.510	0.408	0	1
Whether to give trade credit? (yes=1, no=0)	905	0.731	0.443	0	1
Cash stock of buyer					
Cash stock of surveyed firm	834	41,135	824,011	0	16,800,000
Bargaining power					
Monopoly power of supplier (yes=1, no=0)	867	0.382	0.268	0	1
Potential rival (yes=1, no=0)	924	0.845	0.362	0	1
Year of starting trading	902	1997.774	5.501	1950	2006
(normalized between 0 to 1)					
Enforcement power					
Repaid probability	861	0.032	0.068	0.000	0.485
Delayed probability	861	0.885	0.162	0.244	1
Default probability	861	0.090	0.086	0.000	0.407
Non-default probability	861	0.910	0.086	0.593	1
(repaid prob.+ delayed prob.)					

Source: IDE-DRC survey and JICA survey.

Note: Number of rivals are as follows:no rival=0, one rival=1, a few =2, numerous=3.

of seller's products value among all the inputs of customer) and trade credit ratio and trade amount. Here, we can observe that trade amount has a positive correlation with monopoly power, but correlation between trade credit ratio and monopoly power looks ambiguous. Thirdly, Figure 5 shows cash stock of buyer is independent to trade credit ratio, but is positively correlated with trade amount.

Figure 3: Enforcement power against Trade credit and Trade Amount
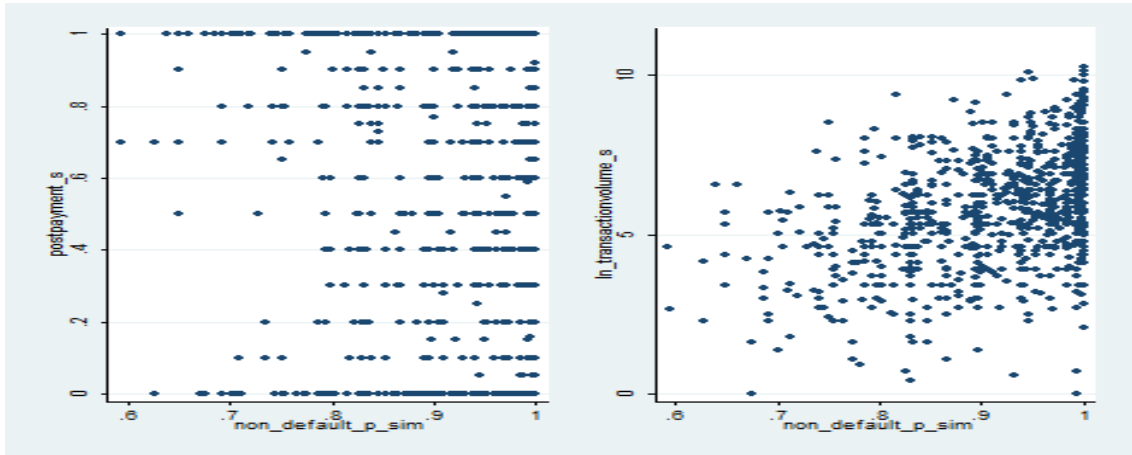
Figure 4: Bargaining power against Trade credit and Trade Amount
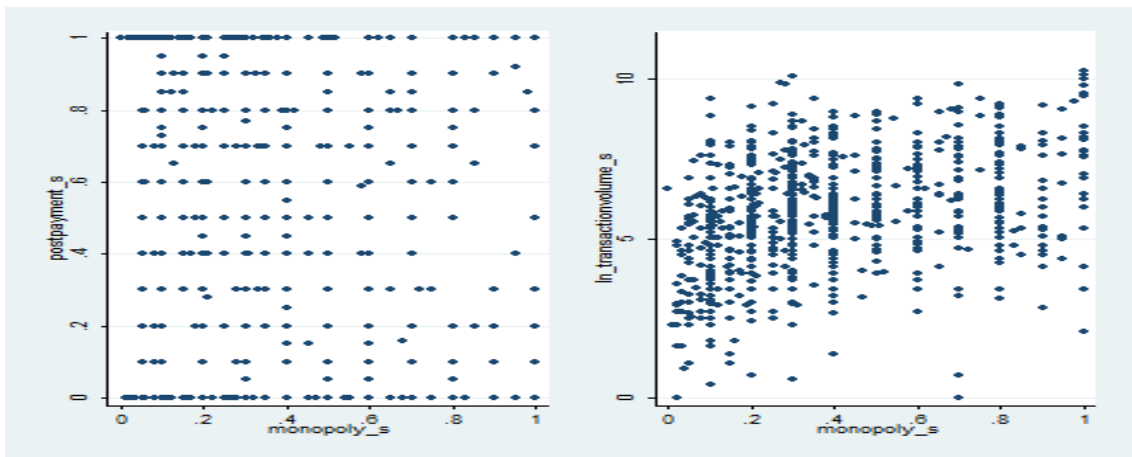
2.2.3 Simple regression

Table 7 shows the results of a regression test on cash and the enforcement and bargaining power on trade credit and trade volume. Here, our survey data indicates the following direction of relationship: the greater the bargaining power of the supplier, the smaller the

14

Figure 5: Cash to Trade credit and Trade Amount
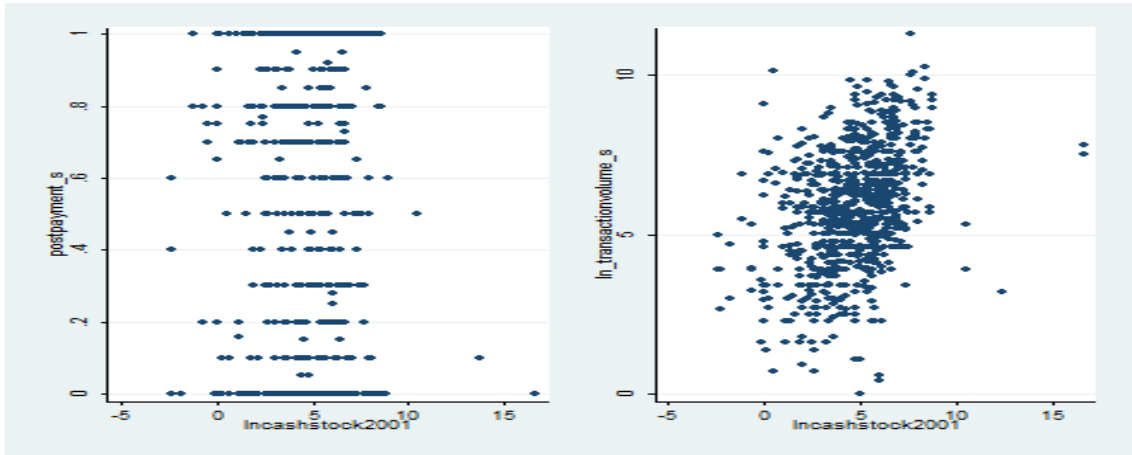
size of trade credit and trade itself; the greater the enforcement power, the larger the size of trade credit and trade itself. The more cash in the hand of the buyer, the larger the trading volume, but the smaller the trade credit ratio. This implies that the cash in hand of the buyer dominantly binds trading between buyer and seller in our data.

Table 7: Regression of bargaining and enforcement powers and cash on trade credit and trade amount

| Dependent Variables	(1) Ratio OLS	(2) Ratio OLS	(3) Ratio IV	(4) Amount OLS	(5) Amount OLS
	Coef(S.E.)	Coef(S.E.)	Coef(S.E.)	Coef(S.E.)	Coef(S.E.)
Cash stock of buyer					
Cash in hand of buyer (log)	-	-	-	0.33*** (0.03)	0.32*** (0.03)
Cash in hand of buyer	-.00 (0.00)	-.00 (0.00)	-.00*** (0.00)	- -	- -
Bargaining power					
Monopoly power of supplier (+)	-0.31 (0.25)	-0.26 (0.12)	0.58 (1.39)	-0.85 (1.89)	1.47 (1.88)
Potential rival (-)	0.41 (0.12)	0.40 (0.12)	0.43 (0.22)	10.24 (8.97)	14.2 (8.9)
Year of starting trading (+)	-0.30 (0.47)	-0.23 (0.48)	1.63 (2.53)	-1.87 (1.21)	-2.34 (1.22)
Enforcement power					
Repaid probability	-4.03*** (1.93)	- -	- -	-3.27 (2.29)	- -
Delayed probability	-2.98*** (1.25)	- -	- -	-0.42 (1.66)	-
Default probability	-2.50*** (1.54)	- -	- -	-4.31 (2.13)	-
Non-default probability	-0.47 (0.47)	- -	- -	- -	5.69*** (1.08)
Constant	3.1** (1.40)	0.45 (0.74)	0.24 (0.90)	-15.67 (18.4)	-29.6 (-29.6)
ProbR square	-	-	-	0.328	0.323
N	730	730	730	729	729

3   Model

In order to explain a mechanism that governs transaction with trade credit, we consider a simple buyer-seller model. We assume here that the value function of a buyer is $V(X) = vX$, and the cost function of a seller is $C(X) = cX$, where X is the trade volume that is endogenously determined in the negotiation process of the buyer and the seller. By assuming

that v and c are exogenously given $v > c$, the first best trade volume is infinite. However, if there is an imperfect enforcement problem as we will explain below, it is not optimal for the seller to provide the first best trade volume.

The imperfect enforcement problem we are thinking about is as follows. Usually the trading price P is determined to be between v and c in order to realize a trade transaction. Even if it is impossible for the buyer to pay the whole amount of the price immediately, the seller can provide trade credit and an efficient transaction can be realized, as long as the seller has a sufficient amount of cash. However, we assume here that enforcement of the payment contract is imperfect. Even if buyers promise to pay the contracted price, they may not pay the total promised payment by the promised date. In such a situation, desirable trade may not be realized if the seller refused to give credit.

Our model goes as follows. At date 1, buyer and seller agree to trade a product and specify a payment schedule. In order to deliver the product at date 1, the seller incurs the cost for production cX and plans to receive payment sufficient for the cost. Conversely, the buyer receives the product at date 1 but will get profit from the product $V(X)$ only at date 2. It is assumed here that the buyer can only pay T at date 1 and will borrow at least $(PX - T)$ from the seller. Also, for simplicity, no time discount is assumed (See Figure 6 for time line).

Figure 6: Timing of Events
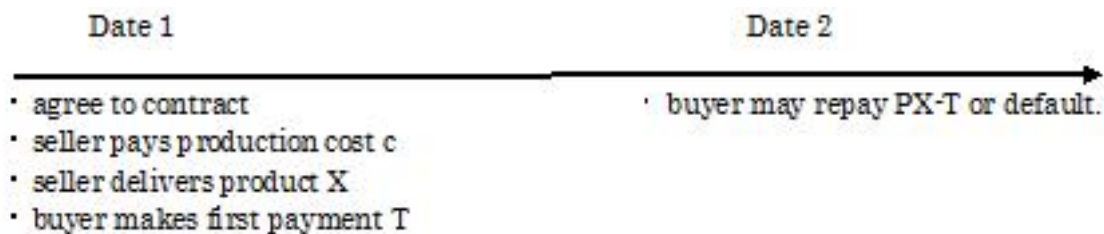
Source: Author.

There are at least two possibilities that the buyer cannot get sufficient trade credit. The first possibility is the seller not having a sufficient amount of cash. Since the seller has to pay the cost for production at date 1, it is difficult to wait until date 2 for payment $(PX - T)$ if the seller does not have a sufficient amount of cash at date 1. The second possibility is

the strategic default of the buyer. If the enforcement for contracts is imperfect, however, the seller has an incentive not to pay $(PX - T)$ at date 2. This paper focuses on the second possibility, and we assume that the seller has a sufficient amount of cash at date 1. To formulate the strategic default incentive by the buyer, we assume that the seller can seize only a part of the buyer's benefit, svX when the default occurs. We call s the enforcement technology of the seller, and we assume $0 < s < 1$. This means that the buyer need not repay $(1 - s)vX$. In this situation, the contracted price P is almost meaningless. Even if both the buyer and seller have agreed to pay a very high price, they can expect that the buyer will default and the seller gets only svX. Hence, the seller can expect to receive,

$$\min[PX - T, svX] \tag{1}$$

Suppose the seller has bargaining power $\theta(0 < \theta < 1)$ toward the buyer, and the total amount of cash that the buyer holds is A. Through negotiation, the seller and buyer come to divide their economic benefit according to a ratio of $\theta : 1 - \theta$ ex ante, but its total size is affected by ex post enforcement power. Under this situation, the profits of the seller and the buyer through this trade can be describe as follows; Seller's profit is,

$$\theta(v - c)X = T + \min[PX - T, svX] - cX, \tag{2}$$

Buyer's profit is,

$$(1 - \theta)(v - c)X = vX - \min[PX - T, svX] - T, \tag{3}$$

The problem of the buyer becomes as follows:

$$\max_{(X,T)} \quad vX - T - \min[PX - T, svX] \tag{4}$$

$$s.t. \ T \le A : Cash \ constraint \ of \ the \ buyer$$

$$\tag{5}$$

In either type of profit is realized in ex post, the benefit of the buyer is an increasing function of X. Hence the buyer's benefit is maximized when X is maximized. If $svX < PX - T$ takes place, the profit of buyer will become $(1 - \theta)(v - c)X = vX - svX - T$. From this equation, we can get the trade volume equation $X = T/(\theta(v - c) + c - sv)$ from equation

(3). Trading volume X is maximized when $T = A$ from the constraint $T \leq A$; therefore $X^* = A/(\theta(v - c) + c - sv)$. Price p is set so as to hold $svX = PX - T$. Inserting trading volume at equilibrium X^* above, we can get the price at equilibrium $P^* = c + \theta(v - c)$. By solving this problem, we obtain the following results:

$$PX^* = \frac{(c + \theta(v - c))}{(\theta(v - c) + c - sv)} A \tag{6}$$

$$\frac{d(PX)}{d\theta} < 0, \frac{d}{ds}(PX) > 0$$

$$(PX - T)^* = \frac{sv}{(\theta(v - c) + c - sv)} A \tag{7}$$

$$\frac{d(PX - T)}{d\theta} < 0, \frac{d(PX - T)}{ds} > 0$$

$$\frac{(PX - T)*}{PX} = \frac{sv}{(\theta(v - c) + c)} \tag{8}$$

$$\frac{((PX - T)/PX)}{d\theta} < 0, \frac{d((PX - T)/PX)}{ds} > 0$$

The above results show that the equilibrium trade volume PX^* is an increasing function of the cash amount of buyer A and enforcement technology of seller s. Moreover, the amount and the ratio of trade credit are also an increasing function of A and s, but all are decreasing functions of the bargaining power of seller.

Proposition: The equilibrium trade volume, trade credit amount and ratio are increasing functions of the cash in hand of buyer A and enforcement technology of seller s. The trade volume, trade credit and trade credit ratio at equilibrium are a decreasing function of the bargaining power of seller θ if the buyer is expected to commit strategic default. The cash in hand of the buyer is a substitute of the enforcement power of the seller.

This proposition implies that the enforcement mechanism is important not only for the trade amount but also for the profit of the buyer. If the enforcement technology is too low (s is very low), the buyer will tend to default. Even if s is low, if A is sufficiently high, the seller's profit can still be high. Why does the buyer have to pay cash A even when he has strong bargaining power? The key point is the imperfect enforcement.

The model analysis here showed that under risky environment, good enforcement mech-

anism may enhance both trade amount trade credit and profit of the buyer. Even if bargaining power of the buyer is stronger than the seller's, the buyer will pay cash. This is because the seller strictly prefers being paid in cash to being provided credit under imperfect enforcement environment, whereas the buyer is indifferent between paying in more cash or paid later if transaction amount remaining the same size. Nash equilibrium of negotiation between the two party is that the buyer will give maximum payment regardless of their bargaining power.

As a whole, the mechanism of governing trade credit supply is different from ordinary debt contract in the following sense. An ordinary debt contract is determined by profitability and risk of a project. But trade credit is also determined by bargaining power of the seller or position in the product market competition, in addition to risk/enforcement probability of contract and profitability of project or the trade. Hence, trade credit has an inter-linked nature as a joint of financial market and product market.

4   Empirical studies: Goal of Estimation and Identification Strategy

4.1   Goal of empirical study

Now we have a model describing the mechanism that governs transaction between buyer and seller with trade credit. The model claims that under poor enforcement environment, the stronger the enforcement power of the seller, the more transaction amount and trade credit, and the larger profit of the buyer will be realized. It also found that cash in hand of the buyer will substitute enforcement power of the seller, and bargaining power of the seller may reduces transaction and trade credit.

Next, we will empirically confirm whether the proposition is true with real data. Now we have a structural model on a mechanism that realizes transaction with trade credit and data from our survey, we can estimate structural parameters of the mechanism. Targets of the empirical study is to confirm whether predictions of the model in previous sections are consistent with the data, and to obtain correct structural parameter. By this empirical procedure, we can claim that the proposition is right or not, and can give an answer to a big question: why high economic growth and expansion of transaction were possible even under the poor enforcement institutions in China. The answer could be as follows that it

is because the cash amount in the economy was sufficient enough to facilitate all possible economic transaction.

Furthermore, once we get correct structural parameters, we can conduct a counter factual or policy simulation. In this paper, we attempted two simulations so that we can more clearly understand the mechanisms of transaction with trade credit under imperfect enforcement system : first, comparing impacts of enhancing bargaining power and improving the third party institutions. Secondly quantifying the value of enforcement power by calculating substitution ratio between cash in hand of buyer and enforcement power.

4.2   Empirical framework: semi-structural transformation

The target of our empirical work is to obtain the structural coefficients of variables such as bargaining power, enforcement power and cash in trade credit and trade volume functions. This will allow us to understand the structural relationship between enforcement and bargaining power, cash and trade credit and trade volume, and also to simulate the impact of an improvement in enforcement probability or the amount of cash in the economy.

In order to develop an empirical equation, we will take a semi-structural approach. We assume trade credit ratio $\frac{(PX-T)}{PX}$ as a probability to give trade credit, and the probability is explained by enforcement power and bargaining power. Our model predicted that the supplier will give trade credit when enforcement power is stronger and bargaining power is weaker. Following this theoretical prediction, we will specify this action as follows. The supplier has bargaining power and enforcement power s on his customer. Let ϵ represent the unobservable variable to the researcher, but assumed to be distributed logistics. The "net power" H of the supplier is defined as $\beta_s' s + \beta_\theta' \theta + \epsilon$. β_s' and β_θ' are parameters for enforcement power and bargaining power respectively. The former is presumed to be positive, and the latter to be negative from the theoretical model. The supplier will give trade credit to his customer when the value of net power H is positive. The probability to give trade credit by

a firm can be specified as following binary logit function:

$$
\begin{aligned}
P(give\ trade\ credit|\theta, s) \ &= \ Prob(I[H(\theta, s, \epsilon) > 0] = 1) \\
&= \ \int I[H(\theta, s, \epsilon) > 0] f(\epsilon) d\epsilon \\
&= \ \int I[\beta_s' s + \beta_\theta' \theta + \epsilon > 0] f(\epsilon) d\epsilon \\
&= \ \int I[\epsilon > -\beta_s' s - \beta_\theta' \theta] f(\epsilon) d\epsilon \\
&= \ \int_{-\beta_s' s - \beta_\theta' \theta}^{\infty} f(\epsilon) d\epsilon \\
&= \ 1 - F(-\beta_s' s - \beta_\theta' \theta) \\
&= \ 1 - \frac{1}{1 + exp(\beta_s' s + \beta_\theta' \theta)} \\
&= \ \frac{exp(\beta_s' s + \beta_\theta' \theta)}{1 + exp(\beta_s' s + \beta_\theta' \theta)} \quad\quad (9)
\end{aligned}
$$

We assume further that the probability is equal to the trade credit ratio predicted by the model.

$$
\begin{aligned}
\frac{(PX - T)}{PX} \ &= \ \frac{exp(\beta_s' s + \beta_\theta' \beta)}{1 + exp(\beta_s' s + \beta_\theta' \beta)} \\
&= \ \frac{sv}{\theta(v - c) + c} \quad\quad (10)
\end{aligned}
$$

Here, we can reduce that transaction volume from equation (1) as follows:

$$
\begin{aligned}
PX^* \ &= \ \frac{\theta(v - c) + c}{\theta(v - c) + c - sv} A \\
&= \ A * exp(1 + exp(\beta_s' s + \beta_\theta' \theta)) \quad\quad (11)
\end{aligned}
$$

By estimating (1) and (2) together with default probability and the choice to give credit in a system, we can get the structural coefficients that indicate the impact of enforcement and bargaining power on both trade credit and trade volume.

4.3   Possible sources of endogeneity

On identifying the coefficients, we need to take care of the following three possible sources of bias: one is the selection bias. The other is the endogeneity of the bargaining power

and enforcement power variables with the unobservable factor. The former is implied by the fact that bargaining power is a determinant of trade credit provision. In this case, the distribution of the ratio and the size of trade credit are truncated at zero, and a certain level of bargaining power of the supplier sets the threshold. In this case, unobservables in the trade credit equations are positively correlated with bargaining power.

$$trade\ credit = t(\theta). \tag{12}$$

The other possible endogeneity happens due to correlation between two independent variables: bargaining power and enforcement power. In a setting of modeling in the previous section, we assumed that ex ante bargaining power and ex post enforcement power are independent. However, it is more realistic to consider that the ex ante bargaining power may consist of ex post enforcement power. Ex post enforcement power is a function of power of enforcement institution, the third party enforcer, at the same time. Thus, it is natural to assume that following relationship below exits.

$$s = s(\theta, \alpha). \tag{13}$$

α stands for institutional or the third party factors to facilitate enforcement. If this relationship is not explicitly specified in estimation, structural coefficients of bargaining power and enforcement power may be biased.

In these cases, an option to remedy endoeneity is the so-called Heckman two step estimators (Heckit: Heckman, 1979, Maddala, 1983). But we will not employ this approach. Instead, we will put these two relationships (equations (12) and (13) directly into the GMM systems, which will be explained below, to be explicitly captured.

The last possible source of endogeneity is the unobservables that are correlated with both bargaining power and enforcement power. To understand this situation, consider the following case. There are some industry-specific or product-specific customs that can affect the trade credit provision and bargaining power of the seller. Take for example the products of the agriculture and machinery industries. The former are usually perishable with frequent sales turnover; the latter are durable that may sell infrequently. Hence, sales in cash are very common for the produce farmer, whereas sales on credit or installments over months, even years, are popular in the machinery industry. In this case, the difference of industry

determines the trade credit size and ratio, but this is unobservable in our data. Secondly, the type of customer or transaction also affects the payment contract even within the same industry. Take vegetables for example. A farmer produces tomatoes, and sells them at the wet market. In this case, the sales are usually in cash primarily because there is no fixed relationship with the customers, even though the farmer has so many competitors. Conversely, if the farmer sells his tomatoes to a big processing company, he may sell them on credit depending on his bargaining power and/or enforcement power. The unobservable difference in the type of trading affects the decision on trade credit supply and size. In this case, we need to conduct instrumental variable estimates so as to correct the bias. We need valid instruments that must be correlated with the bargaining and enforcement powers, but not correlated with unobservable characteristics. Hence, we will do a GMM estimation below to consider the other benefits. In this paper, we will only present the GMM estimates results. Later we will discuss the instruments that we use here.

4.4 System estimation with common coefficients

From our theoretical model, we know the theoretical functional form of trade credit and related items. We are interested in the structure of a system consisting of the following four equations: (1) trade credit volume, (2) trade credit ratio, (3) decision to supply trade credit (this is from equation (12)) and (4) enforcement power (this is from equation (13)) .

$$
\begin{aligned}
\ln PX_{ic} &= lnA + \ln\left(1 + exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)\right) + u_{i1} \\
\frac{PX - T}{PX}_{ic} &= \frac{exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)}{1 + exp(s_{ic}\beta_0 - \theta_{ic}\beta_1))} + u_{i2} \\
Decision\ to\ supply\ credit\ d_{ic} &= \theta_{ic}\beta_2 + u_{i3} \\
Enforcement\ probability\ s_{ic} &= \theta_{ic}\beta_3 + \beta_4 + u_{i4}
\end{aligned}
$$

The empirical moment conditions of this system become as follows:

$$
E(z_i 1 * (\ln PX - \ln a_0 - a \ln A - \ln\left(1 + exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)\right) \tag{14}
$$

$$
E(z_i 2 * (\frac{PX - T}{PX} - \frac{exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)}{(1 + exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)})) \tag{15}
$$

$$
E(z_i 3 * (Decision\ to\ supplier\ credit\ d_{ic} - \theta_{ic}\beta_2)) \tag{16}
$$

$$
E(z_i 3 * (s_{ic} - \theta_{ic}\beta_3 + \beta_4)) \tag{17}
$$

Errors for ijth observation, $u_{i1}, u_{i2}, u_{i3}, u_{i4}$ may be correlated, therefore it would be more efficient to jointly estimate the four equations. Moreover, joint estimation would allow us to impose cross-equation restrictions on the parameters so as to be consistent with the structural model.

4.5 Instruments

In the estimation above, unobservables may affect enforcement and bargaining power and trade credit. We need instruments that are correlated with enforcement and bargaining power, but not correlated with the trade credit variables. We have data on each surveyed firms' transactions with its partner inside and outside of the hometown. Hence, we can exploit this variation in the variables of trade credit and for enforcement and bargaining power in identifying the coefficients of interest (See Figure 2). We will use the independent variables of transaction that are for an opposite-category trading partner (i.e., for the variable from inside-the-hometown sample, we use counterpart information of outside-the-hometown sample) as instruments to separate exogenous variations (due to the impact of administrative borders on transaction) and endogenous variations (due to unobservables). Industry specific differences could be captured by variables of the opposite side of transactions, but they are independently distributed to bargaining power or enforcement power of their own.

5 Results

5.1 Estimation results

Here, we presents the results of estimation. Results here are consistent with prediction of model analysis: that is, trade amount and trade credit are increasing function of enforcement power and cash in hand of buyer. On the contrary, trade credit ratio is a decreasing function of bargaining power of supplier. Structural estimation showed the more clear results.

Table 8 shows the results of the reduced form regression in the system, meaning that trade volume, trade credit ratio, default probability and whether trade credit functions are all estimated simultaneously. The reduced form estimation shows that trading volume is an increasing function of the cash in hand of the buyer and the enforcement probability of the supplier, and the trade credit ratio is a decreasing function of the bargaining power of

the supplier. Default probability is an increasing function and whether to give trade credit is a decreasing function of the bargaining power of the supplier.Though our theoretical model predicted that the trade credit ratio is an increasing function of enforcement, and a decreasing function of bargaining power, the reduced form estimation did not show a positive influence of enforcement power on trade credit ratio.

The (semi) structural parameters are presented in Table 9. It shows again consistent results with our model prediction, i.e., bargaining power (monopoly power among inputs, and potential rivalry) has negative coefficients to provide trade credit, and enforcement power has positive coefficients. The coefficient size of bargaining power is negative to transaction amount and trade credit, and is twice larger in magnitude to enforcement power. This implies that if bargaining power of the supplier enhanced, net impact on transaction amount and trade credit is negative. On the contrary, enhancing enforcement power via non-bargaining power factor will effective to expand transaction in the economy.

5.2 Simulation 1: Impact of bargaining and institutional factor on economic volume

Theoretical model predicted that improvement of bargaining power and institutional power give different impact on expanding economic activity. Here, we can quantify the difference of impact of respective factors by utilizing estimates of structural functions.

By inserting

$$s_{ic} = \theta_{ic}\beta_3 + \beta_4,$$

into

$$lnPX = \ln a_0 + a \ln A + \ln\left(1 + exp(s_{ic}\beta_0 - \theta_{ic}\beta_1)\right),$$

we can get prediction function as follows,

$$lnPX^{predict} = \ln a_0 + a \ln A + \ln\left(1 + exp((\beta_0\beta_3 - \beta_1)\theta_{ic} + \beta_0\beta_4)\right). \tag{18}$$

Here, we can compare whether difference of impact of increasing bargaining power of supplier or institution's enforcement power. Table 10 is comparison of the results of following simulation: increasing bargaining power (actual data is ratio of the input by supplier to total input) by 10 per cent and institutional enforcement power by 10 per cent (here is constant term increased by 10 per cent). Here, we can see that impact of institutional enforcement

26

Table 8: Reduced form in system

	Coef.	(S.E.)
Dependent1: Trade amount (log)		
Cash in hand of buyer (log)	0.31	(0.03)***
Monopoly power of supplier (+)	-0.74	(3.23)
Potential rival (-)	-0.07	(0.53)
Year of starting trading (+)	-6.80	(4.80)
Enforcement probability	11.52	(6.23)*
Dependent 2: Post payment ratio		
Monopoly power of supplier (+)	0.02	(0.64)
Potential rival (-)	0.36	(0.12)***
Year of starting trading (+)	0.83	(0.98)
Enforcement probability	-0.54	(1.23)
Dependent 3: Whether to give trade credit		
Monopoly power of supplier (+)	-0.06	(0.18)
Potential rival (-)	0.43	(0.10)***
Year of starting trading (+)	0.47	(0.15)***
Dependent 4: Non default probability		
Constant	0.55	(0.24)**
Monopoly power of supplier (+)	0.30	(0.09)***
Potential rival (-)	0.01	(0.03)
Year of starting trading (+)	0.27	(0.22)
Number of observation	712	
Number of moment	18	
Test of over identification		
Hansen's J chi2(6)	5.948	p=.4290

power increase is significantly larger than that of bargaining power improvement. This happens because increase of bargaining power can enhance enforcement power, but its impact is canceled out by reduction of credit due to risk avoiding motives. The latter's size is not clearly significantly different from the same as base line size (predicted value of the model).

Table 9: Structural estimation in system

	Coef.	(S.E.)
Dependent: Trade amount (log), post payment ratio		
Enforcement power	0.620	(0.127)***
Bargaining power	-1.297	(0.327)***
Constant		
a	13.64	(5.75)**
a0	-1.85	(1.26)
Dependent 2: Whether to give trade credit		
Constant	-0.59	(0.564)
Monopoly power of supplier	0.30	(0.22)
Potential rival	0.52	(0.09)***
Year of starting trading	0.90	(0.54)*
Dependent 4: Enforcement probability		
Constant	0.27	(0.14)*
Monopoly power of supplier	0.42	(0.06)***
Potential rival	0.04	(0.02)*
Year of starting trading	0.52	(0.14)***
Number of observation	712	
Test of over identification		
Hansen's J chi2(8)	4.85	p=.7734

Source: IDE-DRC survey and JICA survey.

Note:* p<0.1; ** p<0.05; *** p<0.01

Note: Bargaining power variables and enforcement power variables are instrumented by the instrument variables for monopoly power, potential rivals, start year of transaction, and repaid probability. See the text for detail.

5.3 Simulation 2: Substitutive ratio of cash and enforcement power

Another implication of theoretical model is that cash can substitute enforcement power. Here we can quantify this substitutive relationship by our structural coefficients. This can be inferred by the equation which assumes that the elasticity of trading volume to enforcement power of the seller and the elasticity to cash in hand of the buyer is the same. This equation can be obtained from calculating the partial derivatives of trade volume on

enforcement power and on cash from the structural model. Partial derivatives of trade volume on enforcement power and the cash in hand of the buyer are respectively as follows:

$$
\begin{aligned}
\frac{(\partial PX)}{\partial s}\Delta s &= \frac{\partial PX}{\partial A}\Delta A \\
A * exp(s_{ic}\beta_0 - \theta_i c\beta_1)\Delta s &= (1 + exp(s_i\beta_0 - \theta_{ic}\beta_1)) * \Delta A \\
\frac{\Delta A}{\Delta s} &= A * \frac{exp(s_i\beta_0 - \theta_{ic}\beta_1)}{(1 + exp(s_i\beta_0 - \theta_i c\beta_1))}
\end{aligned}
\tag{19}
$$

$\frac{\Delta A}{\Delta s}$ represents how much cash can substitute for one percentage point of enforcement probability. That is the value of enforcement power. The summary statistics of the substitutive ratio of cash and enforcement power are presented in Table 11. The value of one percentage point of enforcement power is $53'000RMB$ at median. This implies that if enforcement power is improved by some institutional reform, the economy can save 53'000 RMB while maintaining the current size of economic activity. The summary statistics show that the value of enforcement is quite different for the ownership types. That for FDI and private owned firm is respectively 48'000 RMB and 53'000 RMB, but for government owned firms it is 105'000RMB, about two times that of private and FDI owned firms. Government firms are cash consuming to maintain their trading volume when enforcement power is lowered.

6 Conclusion

Early literature on trade credit has claimed that bargaining power of the supplier facilitated provision of credit. But the recent empirical literature has documented that bargaining power or monopoly power of supplier has a negative relationship with trade credit provision. This paper explored the mechanism behind this finding. This paper has clarified that improving institutional enforcement power is superior to improving bargaining power in terms of expanding size of economic activity. This happens because the bargaining power has two counteracting impacts: at ex ante negotiation, monopoly power of seller reduces size of economic transaction to avoid ex post default, but it can also enhance enforcement power. Compared to this, impact of institutional enforcement power is straightforward and its effect of expanding economic activity is consistently larger than impact of bargaining

Table 10: Bargaining power improvement vs Institution power improvement

	Obs.	Mean	(S.E.)
Full sample			
Predicted	751	854,894	(342,193)
Simulated1: monopoly power increased by 10 percent	751	761,956	(311,113)
Simulated2: institutional power increased by 10 percent	751	861,742	(344,963)
Simulated 2- Predicted:		6,848	(2,772)***
Predicted - Simulated 1:		92,938	(71,299)*
Sub-sample: Predicted value's significant level (p-value) =< 0.01			
Predicted	484	15,584	(2,374)
Simulated1: monopoly power increased by 10 percent	484	15,072	(2,404)
Simulated2: institutional power increased by 10 percent	484	15,708	(2,393)
Simulated 2- Predicted:		124	(19)***
Predicted - Simulated 1:		512	(257)**

Source: IDE-DRC survey and JICA survey.
Note:* p<0.1; ** p<0.05; *** p<0.01

Table 11: Amount of Cash Substituted by One Percent Point of Enforcement Probability.

000RMB	Mean.	S.D.	Median	Obs.
Ownership type				
FDI	232	396	49	53
Government owned	114,430	1,020,032	107	161
Private owned	258	1,322	50	577
Total	23,329	459,898	55	706

Source: IDE-DRC survey and JICA survey.
Note:* p<0.1; ** p<0.05; *** p<0.01

power improvement. The other finding is that cash can substitute enforcement power to expand economic transaction size.

Consistent with the recent literature on trade credit, this paper also has confirmed that

it is the supplier with weak bargaining power that provides trade credit. In addition to bargaining power, this paper has theorized and empirically confirmed that the cash in hand of the buyer and the enforcement power of the supplier are the determinants of trade credit provision. This would help to explain why observed trade credit is so diversified by industry or the strategy of firms. The second implication concerns the literature on law, finance and development. The recent literature of the field focuses on the importance of external finance for firms, such as bank lending or issuing of securities. These financial channels can explain the investment demand for firms.

The findings here shed light on another mechanism, that of internal finance, or what could be called the mechanism of demand for working capital. The cash in hand of the buyer and a good institution to enforce repayment are substitutes for each other to facilitate economic transactions. This substitutive relationship also explains the traditional custom on bankruptcy: If the buyer cannot make payment to the supplier by the due date, the bank will announce the suspension of transaction with the buyer. This custom can be interpreted as providing exogenously a lower limit of enforcement probability so as to maintain the size of economic activity at a certain level. The third implication concerns macro-monetary policy. The substitute ratio between cash and enforcement power can explain as part of the so-called velocity of money. If the macro value of enforcement power in an economy is high, and the velocity of money is high, then less cash is demanded.

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Competition of the Mechanisms: How Chinese Home Appliance Firms Coped with Default Risk of Trade Credit? [*]

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Abstract

During the transition period from a planned economy to a market economy in the 1990s of China, there was a considerable accrual of deferred payment, and default due to inferior enforcement institutions. This is a very common phenomenon in the transition economies at that time. The Chinese government attempted in vain to deal with this problem by legislation of related institutions and administrative control. Interviews with home electronics appliance firms revealed that firms were able to cope with this problem by adjusting their sales mechanisms (found four types), and the benefit of institutions was limited. A theoretical analysis here found that spot and integration are inferior to the two contract mechanisms in terms of cost and price: a contract with a rebate on volume and prepayment against an exclusive agent can realize the lowest cost and price, and maximize social welfare. Hence, through Bertrand price competition, any of two contract mechanisms is selected to dominate the supply behavior. The empirical part showed that mechanisms converged into a mechanism with a rebate on volume an against exclusive agent, and a firm who initiated this mechanism gained the largest share in the market. Estimation of a (semi) structural supply function that utilizes demand estimates showed that the price level with the dominant mechanisms is the lowest. The competition is the driving force of the convergence of mechanisms and improvement risk management capacity.

Keywords trade credit risk; distribution channel strategy; contract; convergence of mechanisms
JEL Classification Number: L14, L68, L81, D22, G32, O16, O17

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1 Introduction

1.1 Literature on enforcement and inter-firm transaction

The payment method for sold goods is critical in economic transactions. However, this payment practice became increasingly chaotic in the transition economies from planned to market economies in the 1990s. This led academics to focus on how the payment mechanism, or how economic transaction is governed. Empirical investigations preceded to theoretical works: McMillan and Woodruff (1999) discussed how transactions by the then-rapidly increasing private enterprises in Vietnam were supervised. Johnson, McMillan and Woodruff (2002) investigated how the courts in transitional economies function in terms of the supervision of commercial transactions and enforcement. Fafchamps (1996:1997) documented the case of Africa and found that ethnicity affects the performance of a contract, or, more specifically, the performance of payment. Inspired by these empirical works, theoretical studies followed. Dixit (2003a; 2003b; 2009), for example, demonstrated the possibility that economic transactions may expand if enforcement of contracts is guaranteed by a third party or institution.

Contract theory claims that a contract may become incomplete when (1) the contract cannot provide for every eventuality; (2) the content of the contract cannot be verified, and it cannot be enforced by a third party; or (3) no party of the contract has sufficient rationality to create an "optimal contract" (the bounded rationality problem), and (4) adverse selection and moral hazard are caused by asymmetric information. Theoretical literature,particularly, incomplete contract literature, added to the claim that if the contract is incomplete, good arrangement of ownership or other institutions is necessary to obtain efficiency of the economic transaction. Many application of the incomplete contract approach assumes that efficiency of economic transaction heavily depends on the quality of the institution that facilitates the contract enforcement[1]. Some empirical studies support the notion that an economy with good-quality systems experiences more rapid growth (Demigruge-Kunt and Maksimovic, 2001). Hence, most empirical studies focused on the quality of institutions such as ownership or organization of firms, or the role of the court.

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[1]Application of the incomplete contract idea was rapidly expanded. Helpman (2006) conducted an excellent survey on the application of the incomplete contract approach to trade, foreign direct investment and organization of firms

They investigated the impact of the institution, not the design of the contract.

Against this hypothesis of institution-dependent quality of transaction, counter-arguments were presented. Allen, Qian and Qian (2005) assert that the experience of China which accomplished high economic growth in spite of its poor-quality systems is the best counter-evidence to simple institution-dependence hypothesis. Some theoretical papers also presented propositions to challenges the hypothesis. Maskin and Tirole (1999) and Maskin (2002) claimed that the contract does not become incomplete if a proper mechanism is designed even in the case where a contract is incomplete because of an unforeseen contingency not contained in the contract in the situation described in 1) above. They maintain that it is naive to argue that "if the institution or the contract that supports economic transaction is incomplete, inefficiency occurs immediately and then the ownership and other institution that affect the renegotiation will become completely determinant". Empirical works to examine the argument are somewhat limited. With respect to the situation in China, Allen, Qian and Qian (2005) only examined the relationship between the indicators of the quality of the institution and macroeconomic indicators, and empirical findings or analysis on the types of measures or mechanisms that actually worked have not been presented. This paper attempts to fill this gap.

1.2 Perspective of this paper

From the 1990s to the 2000s, institutions that affect Chinese firms' behavior have changed drastically. Those firms which had been only been required to produce goods as planned were suddenly exposed to an environment in which they had to set price, sell goods and receive payment by themselves in order to obtain profit. Under such drastic change of environment, most firms faced the problem that payment for the goods they sold was not made[2]. In order to understand what actually happened in such a chaotic situation, I conducted an interview survey among businessmen in the home electronics appliances industry in China from the early 2000s (Watanabe(forthcoming)). The survey revealed that many manufacturers individually devised measures to avoid default of deferred payment, and that the mechanisms were amazingly diversified. Improvement of institutions such as

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[2]Default or delay of payment will affect cash demand and financing behavior of a firm. Payment performance is affected by not only the contract or institution, but also by how products of the firms are preferred. In this sense, the total strategy of a firm may determine payment probability.

the judicial system is undeniably important, but according to my interviewees, institutional reform was neither crucial nor sufficient. They were able to manage their risk of default of deferred payment by adjusting their own strategy.

This paper aims to evaluate which mechanisms was superior among those that I encountered in the field research. Here, a superior mechanism is defined as the one that generates larger profit for the firm and at the same time induces greater consumers' welfare, that is, a mechanism contributing to social welfare. Through this procedure, not only the superiority or inferiority of each strategy but also the relationship between each strategy and the institutional system are examined.

2 Findings from field work: How did firms cope with trade credit default?

2.1 "Triangular debt": Chaos of deferred payment in the transition period

In the late 1980's, the payment chain stagnated and deferred payment raged out of control among the upper to lower value chains: once payment between any node of a chain from a supplier, assembler, wholesaler and retailer to consumer was deferred, payment to all the members in this chain became unintentionally deferred for two to three years. This phenomenon was called the "triangular debt problem" in Chinese. In 1989, the then-vice prime minister Zhu Rongji took nationwide action to inject cash into the upper members of the transaction chain. However, the policy did not improved the chaotic situation for a long time. Thus, how did firms and businessmen who faced with chaotic deferred payment respond? The perception of interviewees from my field work can be summarized as follows: (1) stagnated deferred payment became more serious in the middle and late of 1990s, after the 1989 policy of Vice-Prime Minister Zhu. This is because (2) the institutions to support market transaction were poorly developed, (3) the firms took time to adjust to market transaction, but (3) the firms could not help but utilize the deferred payment, because there was a critical shortage of cash due to drastic expansion of the demand for money. It was'nt until the end of the 1990s or early 2000s that most of managers of accounting and financial sections of Chinese companies were able to control the risk of default of deferred payment, particularly against strategic default by customers.

2.2 Relation between legal institutions and payment default in China

Legal institutions to mitigate strategic default were introduced but their capacity was extremely limited: commercial bill law and contract law were legislated, code of civil procedure was revised in 1996, and the commercial bill became available in China in 1996. A commercial bill guarantees repayment of a deferred payment, or trade credit received by the borrower. The bill is accepted based on confidence toward the issuer-firm. If the issuer-firm fails to make payment, it is supposed to exit from its transaction network. For example in Japan, if the issuer fails in its on-time repayment twice in six months, all member banks of the bill exchange are informed of the default, and they immediately stop settlement via checking account and loan to the issuer, who goes to bankrupt. However, China's commercial bill was restricted to different sources of confidence: not of issuer-firms, but of banks that guarantee the bill. As a result, the volume of bill issued is also extremely limited compared to the expanding size of economic activity in China[3]. This institutional situation implies that trade credit supported by the commercial bill system was an instruments of limited use for the most of firms. Institutions still remain insufficiently supportive for payment default risk in China.

2.3 Perception and behavior of firms

Therefore, how are firms perceived and how do they behave under such circumstances? One interviewee provided evidence that he was able to control strategic default of deferred payment until 2004. How could be manage this risk of strategic default, even though institutional support was extremely limited? Most interviewees provided similar evidence that (1) most firms had experienced default of deferred payment. (2) This incident sparked the start of reconstruction of distribution channels to cope with the default risk. Several interviewees evaluated that the formulation of good strategy was more effective than the legal institutions mentioned above to deal with default risk of deferred payment. What was interesting is that (3) most of the home appliance manufacturers interviewed formed an

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[3]A bank guaranteed commercial bill has been the main mode in China since 1985. In November 2006, pure commercial bill was introduced for the first time, but its size is still limited compared to a bank guaranteed commercial bill: the pure commercial bill issued 2.02 and 2.216 billion sheets, 457.8 and 593.533 billion RMB in 2006 and 2010, whereas the bank guaranteed commercial bill issued 56.813 and 91.453 billion sheets, $5,050.246$ and $10,251.890$ billion RMB at the end of 2006 and 2010 respectively. The issuance is strictly controlled.

independent mechanism, and then the risk became manageable. One interviewee provided the following evidence;

> Default of deferred payment was serious in 1996 when we started business, but it was under control by 1999. This is not a problem of "institution" but a problem of "management". The most important is whether you effectively rate the creditworthiness of a customer to whom make trade credit; "are they credible," "whether market risk is controllable?" Since I joining this company in 1996, I myself have never experienced the default because I undertook painstaking risk management even though our department had been seriously damaged by deferred payment.

Adoption of a firm's strategy against default risk, such as reconstruction of the sales mechanism and retail strategies, made the default risk of deferred payment manageable. The launch of new institutional support such as a bank guaranteed commercial bill occurred until around the early 2000s.

3 The Four Mechanisms

So, what did they do? My field work identified four sales-management mechanisms: (1)spot transaction with wholesalers, (2)internalization of wholesaling function, and two types of contract; (3) a rebate in proportion to the retail price with major chain stores, (4) a rebate on volume with prepayment to an exclusive wholesaler agent.

3.1 Basic setting

In order to compare the characteristics of the four mechanisms, we set up the following generic model: We consider a transaction between manufacturer M and merchant (he can be a retailer or wholesaler) S in the environment where merchant M can strategically commit a default deferred payment. At time 0, M produces a goods X that incurs cost c, sells amount d at price p toward S. At time 1, merchant S sells product X of amount d at price v to a consumer, then S can commit default though he is expected to make the remaining payment. Merchant S is faced with a normal demand d, which will decrease when price v increases. For this demand d, merchant S and manufacturer M have expectation $E(d) = \theta$ - $v = dk$, where d is a realized sale, and k $(0 \leq k \leq 1)$ is an error between the

expected and realized volume, and θ is the consumer's highest valuation of this product X. We again assume that both wholesaler S and manufacturer M engage in Bertrand pricing competition.

3.2   How strategic default takes place?

When strategic default by a buyer is feasible, expected profit for M and S is as follows: For wholesaler S, both payment and default are options. If he makes payment, he may reduce profit at this stage, but gain the opportunity to continue repeated transaction with M. Let subjective discount rate of S to be $\delta(0 \leq \delta \leq 1)$ and the assumed transaction will repeat endlessly, his expected profit is,

$$\frac{(v-p)dk}{(1-\delta)} = \frac{(v-p)(\theta-v)}{(1-\delta)}.$$

If he chooses to default α of the entire, and is refused from continuing, his expected profit becomes,

$$(v-\alpha p)dk = (v-\alpha p)(\theta-v)$$

If he defaults on the remaining payment, his profit increases by the amount he default. Here, if S can choose α so as to keep $\delta = \frac{(1-\alpha)p}{v-\alpha p}$, payment and default become indifferent to him. Hence, we assume here that wholesaler S will commit default probabilistically. Wholesaler S will default on the remaining α portion of payment with probability t, and will repay full payment with probability $1-t$. Here we call $T \equiv t\alpha + (1-t)$ as payment probability of the buyer or recollection probability of the seller. This uncertainty of payment is exactly the agency cost when principal-manufacturer M relies on agent-wholesaler S's marketing function. In order to see the impact of this agency cost clearly, we assume that the consumer and the retailer will not commit default, and further assume that wholesaler S knows that manufacturer M assume the above expectation. This basic setting is common to all four strategies except the condition of payment specified by each mechanism.

3.3   Selection of mechanisms and competition

In this section, we first consider the type of outcome that appeared if merchant-manufacturer pair engaged in a Bertrand price competition on product retail price v within the same mechanism respectively. By doing this, we can figure out the level of total marginal cost

of each mechanism, because Bertrand pricing competition with the same marginal cost leads market price to a level equal to marginal cost. Threfore, we will consider what will happen if all the four mechanisms compete each other in a Bertrand way. The four mechanisms below are not operating independently in a market, but competing with each other. Here, we first assume that an individual firm chooses a different strategy because their object of optimization is different from others due to reasons unknown to the researcher. Because of this, we could observed heterogenous four mechanisms above appeared in home electronics appliance markets of China in the 2000s, in spite of the fact that some of the four mechanisms is absolutely superior to others as we will see later. Second assumption is that each manufacturer-merchant pairs learn whether or not their mechanism is efficient via competition in the market, then imitates the more efficient mechanism.

3.4 Mechanism 1: Spot transaction with wholesaler

The first type of sales management mechanism is a spot transaction with wholesalers. This is a prototype of the transaction between a manufacturer and merchant of the transition era. Spot transaction proceeds as follows: At time 0, manufacturer M produces goods X, and sells amount d at price p to wholesaler S. Here, wholesaler M defers payment pd. At time 1, wholesaler S sells goods X of amount d at price v to consumers via retailer, who is assumed to simply just transfer goods from the wholesaler to the consumer, and then he is expected to make payment pd but can default on it because there is no mechanism to force him to pay.

Here, expected profit of wholesaler S becomes,

$$\begin{aligned} \Pi_S &= (1-t)(v-p)(\theta-v) + t(v-\alpha p)(\theta-v) \\ &= (v-pT)(\theta-v) \end{aligned} \tag{1}$$

where $T \equiv t\alpha + (1-t)$ is the expected probability of being repaid for manufacturer M. The expected profit of manufacturer M is,

$$\begin{aligned} \Pi_M &= (1-t)(p-c)(\theta-v) + t(\alpha p - c)(\theta-v)) \\ &= (pT-c)(\theta-v). \end{aligned} \tag{2}$$

Prices v and p were set via Bertrant pricing competition. If wholesalers let several

manufactures compete with each other,

$$v = pT$$
$$p = \frac{c}{T}.$$

At equilibrium, sales amount d and profits of M and S are as follows,

Table 1: Spot transaction with wholesaler

v	p	d	Π_M	Π_S
c	$\frac{c}{T}$	$\frac{\theta-c}{k}$	$\frac{c(1-\frac{1}{T})(\theta-c)}{k} < 0$	0

Source: Author.

Here we can see that the profit of manufacturer M is negative (because $c < \frac{c}{T}$ as T<1) if it is faced with competition among brand, and M's profit is an increasing function of probability to be repaid T and deferred payment ratio α. If manufacturer M tries to negotiate with to wholesaler S to make repayment with 100% probability in exchange for any incentives, the manufacturer cannot afford to give this incentives, because he himself is already in deficit. This implies manufacturers must exit from this market only if they cannot change their transaction mechanism.

3.5 Mechanism 2: Integration of wholesaling function

The second type of sales mechanisms attempted by Chinese home appliance firms was the integration of wholesale function with manufacturers. This is attempted by TCL, one of the largest color TV manufacturers. TCL, who experienced serious default of deferred payment by wholesales in the 1990s, integrated the wholesale function at the provincial level into their company. They set up a marketing company in each province that is in charge of the distribution of goods and collection of payment, whereas price and quantity was uniformly set by their national headquarter. Compared to a wholesaler, a retailer is more cash rich because consumers usually buy products with cash. Direct transaction with a retailer is expected to reduce the default risk of deferred payment. Integration of the wholesale function

produced about changes on several levels: first, the agency problem of strategic default by wholesalers disappeared. At the same time, they had to incur fixed cost F, for example, hiring several people to operate provincial marketing companies, building warehouses and other fixed costs. Here, we assume that the retailer will buy products with cash, so no deferred payment happens. They are only faced with the risk that the consumer will not buy. This probability is $1 - k$. Here, the problem of manufacturer M is,

$$
\begin{aligned}
Max_v\ \Pi_S + \Pi_M &= (v - c)dk - F \\
&= (v - c)(\theta - v) - F.
\end{aligned}
$$

Though integration mitigate the default of deferred payment, if brand competition is keen, the price is lowered to equal the marginal cost, and cannot afford fixed cost. This mechanism is not viable for the long term. If manufacturer has some bargaining power to raise prices, there is a possibility that this mechanism will continue.

Table 2: Integration of wholesale function

v	d	$\Pi_M + \Pi_S$
$c + \frac{F}{d}$	$\theta - c - \frac{F}{d}$	0

Source: Author.

3.6   Mechanism 3: A rebate contract on retail price

In China, one type of distributor called "Chain Store" became dominant in the home appliance industry's distribution in the early 2000s. A "Chain Store" is usually a large retailer that has large numbers of store outlets in a relatively large geographical area, and at the same time has a function as wholesaler. A chain store offers spot transaction, which was already discussed in section 3.1, but also offers a contract to pay a rebate on retail prices to manufacturers. The retailer requires manufacturers to make a fixed payment D at the

beginning of the transaction as prepayment, then profit is shared based on turnover. Profit of retailers consists of two parts: the first item is dvm where d is the amount sold, v is the retail price, m is the margin to retailers, and prepayment D. Here, the retailer, who has strong bargaining power, will solve following problem:

$$
\begin{aligned}
\text{Max}_{D,m,v} &= Tdvm + D \\
\text{subject to}: \Pi_M &= dv - Tdvm - D - dc \geq 0 : \text{Participation constraint of M} \\
dk &= \theta - v : \text{Demand curve} \\
D &\leq W : \text{Cash constraint of M}
\end{aligned}
$$

where, T is the recollection ratio of manufacturer M, W is cash constraint of retailer.

Table 3: A rebate on retail price to chain store

v	p	d	m	Π_M	Π_S
$\frac{\theta}{2}$	$c + \frac{2W}{\theta}$	$\frac{\theta}{2}$	$\frac{1}{T}(1 - \frac{2c}{\theta} - \frac{4W}{\theta^2})$	$\frac{\theta}{2}(\frac{\theta}{2} - c)$	0

Source: Author.

At equilibrium of this mechanism, a retailer sets the price just by evaluating the demand nature regardless of cost and procurement price level, and monopolizes the entire profit from this transaction. At the same time, the retail price is high and the sales amount becomes small. There is no explicit mechanism to prevent strategic default by the buyer, but because strategic default is irrelevant to the profit of retailer M, retailer has no incentive to default.

3.7 Mechanism 4: A rebate contract on volume with down payment to exclusive agent wholesaler

The last mechanism is a packaged-contract that consists of a rebate on volume and prepayment with exclusive to agent wholesaler. This mechanism was first introduced by GREE, one of the largest air-conditioner manufacturers in China, in the late 1990s after which other brand-manufacturers have followed suit and started to imitate since the middle of the 2000s. A contract mechanism between a manufacturer and wholesaler offers detailed

conditions: (1) manufacturers exclusively transact with selected agent-wholesalers and offer a mechanism. (2) The mechanism (d, Z, m) offered consists of down-payment Z, rebate according to volume d, and margin m given to wholesalers. (3) Manufacturer M requests down-payment Z in exchange for higher margin md with larger sales amount d. With regard to margin m, in order to raise recollection of deferred payment of wholesaler S, M provides the following incentives: if S accomplishes a higher recollection rate of payment than the reference level, give higher margin m_1; if the realized recollection rate is lower than the reference level, give lower margin m_0. Here, we assume that m_1 is the maximum of profit in hand of M, while $m_0 = 0$ for simplicity. Wholesaler S will decide the amount of transaction d taking into consideration of his own cash constraint and demand nature. The probability of being purchased by a consumer is assumed to be k. Here, wholesaler S gives trade credit to manufacturer M by $md^2 = md * d$. This is a very important feature of this mechanism. Because of this provision, this mechanism succeeds in mitigating the default risk of deferred payment by transforming wholesaler S from a receiver of trade credit to supplier. Here, wholesaler S will solves the following problems,

$$\text{Max}_{dk,Z} \ \Pi_S \ = \ kd(v - p)$$

$$\text{subject to} \tag{3}$$

$$p \ = \ Z - md : \text{Rebate function}$$

$$Z \ \geq \ A : \text{Cash constraint of S}$$

$$\Pi_M \ = \ dk(p - c) \geq 0 : \text{Participation constraint of M}$$

$$dk \ = \ \theta - v : \text{Demand curve}$$

$$m \ = \ (m_0, m_1) = (0, m_{max}) : \text{margin}$$

$$\tag{4}$$

The equilibrium of this problem is solved as follows: At time 0, manufacturer M offers a mechanism with deposit Z and margin menu $m = (m_0, m_1)$. Wholesaler S will choose purchase amount dk so as to maximize his profit under the relevant constraints. At time 1, wholesaler S undertakes good management so as to be charged a better margin m_1 by manufacturer M, and will be able to obtain a higher recollection rate than the reference level with probability $s(0 \geq s \geq 1)$. Solving this problem backwardly, we obtain the following

outcome. Wholesaler S will set purchase amount $dk^* = \frac{\theta - Z}{2(1 - m/k)}$, which maximizes Π_S. Expected margin level $m_e = sm_1 + (1 - s)m_0 = sm_{max} + (1 - s)0 = sm_{max}$. From the participation constraint of M, $m \geq (Z - c)/d$ holds, $m_{max} = (Z - c)/d$. Inserting this m into the dk^* function, we can derive $d^* = \frac{\theta + Z - 2c}{2k}$ and $m_1^* = \frac{2k(Z - c)}{\theta + Z - 2c}$. The level of down-payment Z is set by manufacturer M in real practice. Profit of $M = \frac{\theta - Z - 2c}{2k}(Z - c)(1 - s)$ is an increasing function of Z (if $\frac{3c - \theta}{2} \geq Z$). Hence, M requires S to pay Z at maximum ($Z = Z_{max} = A$). At equilibrium, manufacturer M sets wholesale prices p at the lowest level regardless of the degree of competition intensity. In this mechanism, M allows S to commit to a larger transaction by relinquishing all rent from this transaction to S. For M, with the larger cash in hand of S, M can enjoy lower retail price v and larger sales d.

Table 4: Rebate on volume with exclusive agent

v	p	d	m	Π_M	Π_S	
$\frac{\theta - A + 2c}{2}$	c	$\frac{\theta + A - 2c}{2k}$	$\frac{2k(A - c)}{\theta + A - 2c}$	0	$\frac{\theta + A - 2c}{2k}$	$\frac{\theta - A - 2c}{2}$

3.8 Outcome of competition among four strategies

The four mechanisms mentioned previously are not operating independently in a market, but competing with each other. Here, we consider the type of outcome that appears after the competition among the four mechanisms. First, we consider that an individual firm chooses a different strategy because their object of optimization differs from one firm to another due to reasons unknown to the researcher. As a result, in spite of the fact that some of the mechanisms is absolutely superior to others, we observed that the four heterogenous mechanisms above appeared in the home electronics appliance markets of China in the 2000s. Here, we also show that a contract designed against default risk of deferred payment is the most efficient in terms of social welfare maximization.

In order to perform this analysis, we consider here that the retail price level as the "total marginal cost" of each mechanisms that involves all variable costs including incentives to

Table 5: Competing mechanisms

	$v = TMC$	d	Π_M
Mechanism 1: Spot	c	$\frac{\theta-c}{2k}$	$\left(c - \frac{c}{T}\right)\frac{\theta-c}{2k} < 0$
Mechanism 2: Integration	$c + \frac{F}{d}$	$\theta - c - \frac{F}{d}$	0
Mechanism 3: Rebate on retail price	$\frac{\theta}{2}$	$\frac{\theta}{2}$	0
Mechanism 4: Rebate on volume with down-payment	$\frac{\theta-A+2c}{2}$	$\frac{\theta+A-2c}{2k}$	0

Source: Author.
Note: TMC = total marginal cost.

retailers or wholesalers, that manufacturers should incur, where cost c in our generic model represents only pure production variable cost. Then, we consider what will happen if the four mechanisms with different marginal cost engaged in Bertrand price competition with each other. If cash in hand of wholesaler S is sufficiently large ($A \geq 2c$), and the total marginal cost of "Rebate on volume with down-payment" is the lowest, "Rebate on retail price" follows. Total marginal cost of "Spot" and "Integration" is always higher than the two mechanisms above as long as production marginal cost c is positive.

Next, let us consider the pricing strategies of a user of the "Rebate on retail price" mechanism. His total marginal cost is the second lowest among the four mechanisms. This firm can set a price that is lower than $\frac{\theta+c}{2}$, the total cost of "Spot" and "Integration", so as to force the latter two types to exit from the market. But it cannot set a price lower than its own total cost $\frac{\theta}{2}$. Hence, the best response price level for the "Rebate on retail price" mechanism is $\frac{\theta}{2}$. Here, "Spot" and "Integration" mechanisms were driven out of the market. A firm that uses the the "Rebate on volume with down-payment" mechanism, and whose total marginal cost is the lowest among the four mechanisms will also set the same level of price as the user of the "Rebate on retail price" mechanism taker. This is because of the following logic: if it sets its price at $\frac{\theta-A+2c}{2}$, its own total marginal cost level, it can monopolize market demand, but its profit is zero. If it sets its price at a level slightly

lower than the total marginal cost of his competitor, for example, the user of "Rebate on retail price," $\frac{\theta}{2} - \epsilon$, it can monopolize demand and gain non-zero positive profit. The forth mechanism's profit is maximized if it sets price $\frac{\theta}{2} - \epsilon$ and minimizes ϵ to the minimal limit. Here, the market equilibrium appears as follows: price in a market is $v_c = \frac{\theta}{2}$, and two mechanisms "Rebate on retail price" and "Rebate on volume with down-payment" can survive in this market, but their profit levels are different: "Rebate on retail price" must operate with zero profit, whereas "Retail on volume with down-payment" can gain rent of $\frac{A-2c}{2}$ per unit.

If cash held by wholesaler S who is using the "Retail on volume with down-payment" is not sufficient enough and $A \leq 2c$ holds, the market equilibrium price remains unchanged, $v_c = \frac{\theta}{2}$, though both mechanisms earn zero profit. If firms who use "Rebate on retail price" relinquish their mechanism and succeed in transferring to "Rebate on volume with down-payment," when the mechanism in a market converges into the latter, the market equilibrium function also changed into $v_c = \frac{\theta - A + 2c}{2}$. If cash of wholesaler S in this mechanism is sufficient enough, market equilibrium price is lowered to be $v_c = c$, where retail price is the lowest and sales unit is the largest, which produces the largest consumer welfare. This implies that social optimum can be realized by the "Rebate on volume with down-payment" mechanism. This mechanism can realize the same situation as the perfect market condition are supposed to do according to the textbooks of microeconomics.

Market equilibrium analysis above can be summarized as follows: among the four mechanisms which were observed in the field work, total marginal cost of "Spot" and "Integration" are absolutely higher than the two contract mechanisms "Rebate on retail price" and "Rebate on volume with down-payment" in the presence of risk of strategic default of deferred payment; hence, the former two mechanisms are supposed to be driven out of the market. Market equilibrium price depends on the sign of $A - 2c$: if $A - 2c$ is negative, market price is set equal to total marginal cost of $v_c = \frac{\theta}{2}$, if $A - 2c$ is positive, market price is set as $v_c = \frac{\theta - A + 2c}{2}$. In the former case, equilibrium price and volumes is inferior to the perfect market condition. But for the latter case, equilibrium price and volume are equivalent to perfect competitive market situation, which is most efficient because it can maximize the sum of consumer welfare and a firm's profit if A is sufficiently high, say, $A \geq \theta$ holds.

Proposition : Under an environment where strategic default is feasible, "Spot" and "Integration" mechanisms are inferior to the "Rebate on retail pricing" or "Rebate on volume with down-payment" mechanisms in terms of social welfare maximization. "Rebate on volume with down-payment" is socially optimal because it can lower the retail price as low as $v_c = c$ if $A \geq \theta$ holds. "Rebate on retail pricing" is second to "Rebate on volume with down-payment" because it cannot lower the retail price below $\frac{\theta}{2}$.

4 Empirical Studies

4.1 Empirical Strategy

Empirical studies are presented here to investigate whether the proposition holds with actual data. In order to accomplish this target, I will implement the following strategy: First, I will show convergence of mechanism appears in the market. Above proposition claims a "superior order" among the four mechanisms. However, as an individual firms have their own management target due to reasons unknown to the researcher, thus they employ heterogenous mechanisms. Here, it is reasonable to hypothesize that the mechanism employed by each firm will be converged to the most efficient mechanisms following informational diffusion. Hence, the first empirical target is to show the type of mechanism that was used by each brand firm from the fieldwork and published data. Next, in order to test this hypothesis, I will first infer substitution patterns among brands from market outcome data, such as price, market share and other market outcome data. Then, I will test whether pricing strategies are functions of types of mechanisms regarding sales and distribution. By conducting this structural approach, we can separate the impact of demand side and supply side on pricing, and evaluate correctly the impact of strategy at supply side. [4]

4.2 Convergence to a mechanism

First, I showed the development of sales mechanisms that are actually used by home electronics appliance firms of China in the 2000s. This information was collected by my inter-

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[4]Rigorously speaking, direct empirical testing on the pricing functions induced above is ideal. However, there is no detailed data on wholesalers/retailers' cash position, or other information of the transaction. Hence, we adopt a strategy to evaluate whether the revealed market outcome fits with the theoretical prediction of the analysis above.

views and press releases or other literatures. Hence, heterogenous mechanisms coexit, and at the same time, convergence of the mechanisms takes place. Table 6 is a summary of the development of sales mechanisms of air conditioner and color TV manufacturers' in China from 2000 to 2007, the coverage period of market data. The sales mechanism prototype was the spot transaction in the 1990s, but as already seen, firms attempted several mechanisms: integration of wholesale function, transaction with monopolistic chain stores, and establishing contract mechanisms with exclusive agents. In the early 2000s, chain stores became a dominant sales channel for most home electronics appliances brands, and a joint possession of the distribution channel were also attempted very recently.

Table 6: Convergence of the Mechanisms

	2000	2001	2002	2003	2004	2005	2006	2007	2007 market share (Rank)
Air-conditioner									
Gree	EA	EA	EA	EA	EA	EA	EA	EA	17.2 (1)
Midea	CS	CS	CS	CS	CS	CS	EA	EA	16.1 (2)
Haier	CS	CS	CS	CS	CS	CS	EA/CS	EA/CS	14.2 (3)
Panasonic	CS	CS	CS	CS	CS	CS	CS	CS	6.5 (4)
Aux	-	-	-	-	-	-	-	-	5.9 (5)
Hisense	CS	CS	CS	CS	CS	CS	EA/CS	EA/CS	4.64 (6)
Chigo	-	-	-	-	-	-	EA/CS	EA/CS	4.3(7)
Kelon	CS	CS	CS	CS	CS	CS	EA/CS	EA/CS	3.7 (8)
Chunlan	-	-	-	-	-	-	-	-	2.9 (9)
Samsung	-	-	-	-	-	-	-	-	1.8 (10)
Changhong	CS	CS	CS	CS	CS	CS	CS	CS/IN	1.34 (11)
TCL	IN	IN	IN	IN	CS	CS	CS/EA	CS/JC	0.47 (-)
Daikin	EA	EA	EA	EA	EA	EA	EA	EA	0.79 (-)
Color-TV									
Konka	CS	CS	CS	CS	CS	CS	CS	CS	13.8 (1)
Changhong	CS	CS	CS	CS	CS	CS	CS	CS/IN	12.7 (2)
Skyworth	CS	CS	CS	CS	CS	CS	CS	CS	11.9(3)
Hisense	CS	CS	CS	CS	CS	CS	EA/CS	EA/CS	10.4 (4)
TCL	IN	IN	IN	IN	CS	CS	CS/EA	CS/JC	8.83 (5)
Haier	CS	CS	CS	CS	CS	CS	EA/CS	EA/CS	4.6 (6)
Samsung	CS	CS	CS	CS	CS	CS	CS	CS	4.55 (7)
Sony	CS	CS	CS	CS	CS	CS	CS	CS	1.2 (-)
Panasonic	CS	CS	CS	CS	CS	CS	CS	CS	0.13 (-)

Data Source: GfK Research China.

Selective Sources of Information on Sales Mechanisms of each brand:

Gree Dong Minzhu (CEO of the company), *A Journey without Regret*, Zhuhai Publishing Company,2006 (In Chinese).

Haier http://homea.people.com.cn/GB/41392/6591831.html.(Accessed 15 Sept, 2011)

Hisense, Kelon http://news.chinaluxus.com/Bsn/20110608/31996.html.(Accessed 13 Sept, 2011)

Midea http://hea.yidaba.com/heahot/900478.shtml (Accessed 1 Sept, 2011)

Chigo http://news.chinaluxus.com/Bsn/20110608/31996.html (Accessed 13 Sept, 2011)

TCL http://www.globrand.com/2009/166255.shtml (Accessed 15 Sept, 2011)

Changhong http://tech.sina.com.cn/e/2007-08-30/01571707043.shtml.(Accessed 13 Sept, 2011)

Konka http://homea.people.com.cn/GB/5321772.html (Accessed 15 Sept, 2011)

Skyworth http://www.skyworth.com/cn/news-detail-1333.html (Accessed 15 Sept, 2011)

Daikin TAKAHASHI Motohito, *Sell Air-Conditioner to the Chinese* ,Soshisha Publishing Company, 2005 (In Japanese)

Panasonic, Sony Author's interview.

general Author's interview and Watanabe(forthcoming)

Note: EA: Exclusive Agent (Rebate on volume with down-payment). CS: Chain Store (Rebate on retail price and Spot). IN:Integration of wholesales function. JC:Joint channel. −: unknown

5 Pricing by the Mechanisms

The next empirical test is whether the convergence to "Rebate on volume with down-payment" mechanisms is related to pricing and the cost of a firm. If so, it implies the convergence of mechanisms were driven by the competition. To evaluate actual pricing strategies of the firms I studied, I first estimate the demand system to obtain substitutability between brands, then utilize the estimates to correctly identify the supply strategies.

5.1 Data

To estimate substitutability among brands, I utilize data on air-conditioner and color TV markets of China. Data I utilized here is audited by GfK marketing in China. CTV data contains yearly sales values and numbers of unit sold by TV types(CRT/LCD/PDP), screen size (21 inch, 22-32 inch and over 32 inch) and air-conditioner types contains sales values and numbers of unit sold by horsepower (below 1HP, 1HP to 2HP, over 2HP) for 21 cities[5] for year 200-2002, and 30 cities[6] for the year 2003 to 2007. Demographic data such as the average wage and distribution of wage at each market are obtained from public data from the China State Statistical Bureau: China City Statistical Yearbook for 2002 to 2008 for average wage and income; and China Price and Urban Household Expenditure Yearbook 2000 to 2005; and China Urban Life and Price yearbook for 2006 to 2007 for distributions of income and expenditure data.

5.2 Estimation model

Here, consumer demand is modeled using a discrete-choice formulation first. On the supply side, I model competition between several brands in different geographical markets at different timings.

5.2.1 Demand

Consumers select a brand in a given market (=city, here) to maximize their utility. I view a product as a particular brand sold at each city $m = 1, 2, ...M$.(I delete m hereafter simply

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[5]Shanghai, Beijing, Nanjing, Guangzhou, Harbin, Chongqing, Xian, Chengdu, Shenyang, Tianjin, Wuhan, Hangzhou, Wuxi, Kunming, Qingdao, Changsha, Shenzhen, Nanning, Dalian, Fuzhou, Xiamen

[6]In addition to the aforementioned 21 cities, Dongguan, Hefei, Jinan, Nanchang, Ningbo, Shijiazhuang, Suzhou, Taiyuan, Zhengzhou

for the reader's convenience). The indirect utility U_{ijt} of consumer i from purchasing brand $j = 1, 2, ...J$ at time $t = 1, 2, ...T$ is,

$$u_{ijt} = -\alpha p_{jt} + \beta X_{jt} + \xi_{jt} + \epsilon_{ijt}. \tag{5}$$

p_{jt} denotes price of brand j at market m in time t. Other factors affect product choice, such as features of product x_{jt}. Following Berry (1994) or Nevo (2000), we can rewrite the utility of consumer i for brand j as follows:

$$
\begin{aligned}
u_{ijt} &= -\alpha_i y_i + \delta_{jt} + \mu_{ijt} + \epsilon_{ijt} \\
\text{where, } \delta_{jt} &= x_{jt}\beta - \alpha p_{jt} + \xi_{jt}, \\
\mu_{ijt} &= \beta_{ib}B_{jt} + \alpha_i p_{jt},
\end{aligned}
\tag{6}
$$

where the random coefficients are $\beta_{iB} = \sigma_B \nu_i$ with $\nu_i \; N(0,1)$; and $\alpha_i = \alpha + \sigma_I I_i$ with I_i the observed income. We can rewrite the model as,

$$u_{ijt} = \delta_{jt} + \sigma_B \nu_i B_{jt} + \sigma_I I_i p_{it} + \epsilon_{ijt}. \tag{7}$$

5.2.2   Supply

Next, suppliers are supposed to maximize their profit at time t. Suppose there are B firms, each of which produces some subset, of $\mathcal{J}_b$ the $j = 1, ..., J$. The profits of firm b are

$$\Pi_b = \Sigma_{j\in\mathcal{J}}(p_j - mc_j)Ms_j(p_j) - C_f$$

where $s_j(p)$ is the share of product j , which is a function of the prices of all the products, M is the size of the market, and C_f is the fixed cost of production. Assuming the existence of a pure-strategy Bertrand-Nash equilibrium in prices, and that the prices that support it are strictly positive, the price p_j of any product j produced by firm b must satisfy the first-order condition:

$$s_j(p) + \Sigma_{j\in\mathcal{J}}(p_j - mc_j)\frac{\partial s_j(p)}{\partial p_j} = 0. \tag{8}$$

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This set of J equations implies price-costs margins for each goods. The markups can be solved for explicitly by defining $S_{jk} = -\partial s_j/\partial p_k$ for $j, k = 1, ...J$ and,

$$\Omega_{jk}^* = \begin{cases} 1, & \text{if } any\ j, k \subset \mathcal{J}_f \\ 0, & \text{otherwise}, \end{cases} \tag{9}$$

and Ω is a JxJ matrix with $\Omega_{jk} = \Omega_{jk}^* * S_{jk}$. Then, first order conditions in the vector term become

$$s(\mathbf{p}) - \Omega(\mathbf{p} - \mathbf{mc}) = 0,$$

where $s(), p$ and mc are $Jx1$ vectors of market shares, prices, and marginal cost, respectively. This implies the markup equation,

$$\mathbf{p} - \mathbf{mc} = \Omega^{-1}\mathbf{s}(\mathbf{p}).$$

5.2.3 Demand substitution pattern

Using estimates of the demand elasticities, we can estimate the price cost margin (PCM) without observing actual cost.

Here, we can compare the elasticities from pure logit demand estimates and random coefficient logit demand coefficients.

Own and cross price elasticity of the market share induced from choice function (8) are

$$\eta_{jkt} = \frac{\partial s_{jt}p_{kt}}{\partial p_{kt}s_{jt}} = \begin{cases} -\alpha p_{jt}(1 - s_{jt}) & \text{if } j=k, \\ \alpha p_{kt}s_{kt} & \text{otherwise}. \end{cases} \tag{10}$$

when market share is defined by logit form:

$$s_{jt} = \frac{exp(\delta_{jt} + \sigma_B \nu_i B_{jt} + \sigma_I I_i p_{it})}{1 + \Sigma_{k=1}^J exp(\delta_{jt} + \sigma_B \nu_i B_{jt} + \sigma_I I_i p_{it})}{}^7. \tag{11}$$

---

[7]Here, instead of complete structural form claimed by Berry (1995), Nevo (2000) or Rasmusen (2007), we use a reduced form that allows the linear addition of interaction terms with products characteristics and demographic data, here, the average wage of each market. This approach provides a degree of flexibility compared to simply defining market share s_{jt} as $\delta_{jt} + \epsilon_{jt}$, but it is inconsistent with the theoretical model; it violates the rule that the sum of predicted market shares of the differentiated products should not add up to more than one. See Rasmusen (2007). If you follow the complete structural approach of BLP, the price elasticities changes into the following nonlinear format. Distributions of demographics D and unobservable disturbances ν are denoted by $P_D^*(D)$ and $P_\nu^*(\nu)$. The overall market share of product j in time t is found

5.3 Estimation of demand system

We first estimate demand and then supply. In the case of logit demand, the utility u_{ijt} is given by $ln(s_{jt}) - ln(s_{0t})$. Here, we assume that the outside option is "NOT buy any brand", hence, s_{0t} is assumed to be zero. Our estimation equation is,

$$ln(s_{jt}) - ln(s_{0t}) = \delta_{jt} + \sigma_B I_i B_{jt} + \sigma_I I_i p_{it} + yeardummy + firmdummy + \xi_{jt}[8]. \quad (12)$$

Following the argument of the identification of oligopoly models, I claim that the parameters of the demand system can be identified. Identification of price parameters, which is critical for our margin calculation, relies on the fact the unobserved determinants of demand are uncorrelated with input prices. To account for the potential endogeneity of prices because of the presence of the changes in unobserved attributes, and because we added interaction terms of the average wage of each market and product characteristics, we use the GMM estimator with prices of the same brand of other markets as instrument variables. This instrument strategy adheres to the so-called Hausuman-instruments approach (Hausman, 1997). The Hausman instruments approach relies on the assumption that prices in two different markets be correlated via common cost shocks and not via common demand side shocks such as nationwide demand shock. If a situation such as particular two markets' demand shrink a certain common shock occurring when shrinkage in demand tales place between two particular markets, the instruments are invalid. However, in our estimation case, this IV works effectively[9].

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by integrating the market shares selected by each consumer's equation across the individual types:

$$\eta_{jkt} = \frac{\partial s_{jt} p_{kt}}{\partial p_{kt} s_{jt}} = \begin{cases} -\frac{p_{jt}}{s_{jt}} \int \alpha p_{jt} (1 - s_{jt}) d\hat{P}_D^*(D) dP_\nu^*(\nu) & \text{if j=k,} \\ \frac{p_{kt}}{s_{jt}} \int \alpha p_{kt} s_{kt} d\hat{P}_D^*(D) dP_\nu^*(\nu) & \text{otherwise.} \end{cases}$$

when market share is defined by logit form:

$$\begin{aligned} s_{jt} &= \int_\nu \int_D s_{ijt} d\hat{P}_D^*(D) dP_\nu^*(\nu) \\ &= \int_\nu \int_D [\frac{exp(\delta_{jt} + \sigma_B \nu_i B_{jt} + \sigma_I I_i p_{it})}{1 + \Sigma_{k=1}^J exp(\delta_{jt} + \sigma_B \nu_i B_{jt} + \sigma_I I_i p_{it})}] d\hat{P}_D^*(D) dP_\nu^*(\nu). \end{aligned}$$

[8]Here, unobserbed feature ν_i is replaced with observed income I_i for simplicity of estimation.
[9]Demand estimates results in Tables 8, 7 show that the IV were confirmed as exogenous to our demand systems.

5.4 Supply function

Once demand is identified, I turn to the supply side with substitution patterns from the demand estimates. By estimating supply function, I verify whether or not and how much cost factor really matters in pricing strategy.Our estimation equation on the supply side is,

$$p_{jt} = \lambda m_{jt} + z_{jt}\theta + \xi_b + \eta. \tag{13}$$

where, m is the price-cost margin for the entire process and z is the cost factor [10]. We regarded competing sales mechanisms in our model analysis as the cost factor for each firm. If θ of any mechanism is statistically significant, the mechanism is a determinants of the market equilibrium price. If λ is statistically significant, we can regard that market is as oligopolistic [11]. Because margin m is determined by the consumer, and cost factor z is determined within each firm, it is reasonable to assume that η is not correlated to margin m and cost factor z if the time invariant factor within each firm is eliminated. Hence, we estimates the function by the fixed effect OLS estimator.

6 Estimation results

6.1 Demand estimates

Demand model estimates for the air-conditioner market and color TV markets are presented in Tables 7 and Table 8. On average, prices have a significant and negative impact on utility. Own price elasticities ranges for air conditioners range between -18.9 to -.73 and -3.66 on average. The color TV market's own price elasticities rages between -281.5 to -1.03, and -13.9 on average [12]. Regarding product characteristics, capacity size (horsepower category) is not significant for air-conditioners, but display type and screen size of TVs are significant. Interacted terms of product characteristics and wage are significant and positive for both markets. Brand effects are significant for both markets as well.

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[10]This estimation model follows Vilass-Boas(2007).

[11]If λ is statistically insignificant, the market can be regarded as perfectly competitive.

[12]These figures are much more greater in absolute size compared to the results of aforementioned literatures; for example, cereal market (Nevo, 2000) or coffee market(Draganska, Klapper and Villas-Boas, 2010). This may reveal a difference in the nature of products: i.e., a home electronics appliance is a luxury goods, whereas cereal or coffee is a commodity. While nature of the market might be different, the previous empirical studies examined data from developed economies like German and US, but this data is from China, a developing and transitional economy.

Table 7: Demand Estimates: Air-conditioner

	Logit demand estimates	
Parameter	Estimate	Std.Err.
Product characteristics		
Price	-.00097	(.00013)***
HP 2-	.000	
HP1 to 2	.2825	(.541)
Interacted terms with demographics		
ln(wage)x price	.00009	(.00001)***
ln(wage) x HP2-	-.142	(.011)***
ln(wage) x HP1-2	-.002	(.057)***
Brand effect: Gree as reference		
Haier	.5274	(.0473)***
Hisense	-.6343	(.0568)***
Midea	.0652	(.0474)
Changhong	-1.123	(.0652)***
Daikin	-.8155	(.2547)***
Panasonic	-.7500	(.0707)***
No. of obs.	6854	
R-square	0.5856	
GMM-C statistics	-0.0199(1)	

Note * p<0.1; ** p<0.05; *** p<0.01
Source Author's calculation.

6.1.1 Supply estimates

Supply function estimates revealed which mechanism dominates market equilibrium price and supply behavior. Because information on which firm uses which mechanism is not clear for all brands on the market data, estimation was performed for the limited data set, as presented in Table 9. The brand contained within the limited data is presented below the estimation results. The results show that mechanism 4 (Rebate on volume with down-payment to exclusive agent) is a cost factor for the air-conditioner market. This is consistent with the prediction of the theoretical model in Section 3. This result is consistent with our model analysis: In the presence of default of deferred payment, the sales mechanism that

Table 8: Demand Estimates: Color TV

Parameter	Estimate	Std.Err.
	Logit demand estimates	
Product characteristics		
Price	-.0018	(.000)**
LCD	-1.969	(.103)***
PDP	-2.200	(.122)***
Size -32	8.173	(3.521)**
Size 32 and larger	11.408	(9.269)
Interacted terms with demographics		
ln(wage) x price	.0001	(0.000)**
ln(wage) x Size -32	-.753	(3.556)**
ln(wage) x Size 32	-1.178	(1.26)
Brand effect: Changhong is reference		
TCL	-.172	(.0575)***
Haier	-.555	(.0586)***
Hisense	-.0956	(.0578)*
Konka	-.0985	(.0590)*
Skyworth	-.2625	(.0587)***
Sony	-1.441	(.0137)***
Panasonic	-.9788	(.1177)***
Samsung	-1.550	(.1892)***
No. of obs.	12664	
R-square	0.4492	
GMM-C statistics	-.1407(1)	

Note * p<0.1; ** p<0.05; *** p<0.01.
Source Author's calculation.

specified rebate and down-payment with a limited trading partner can accomplish a more efficient and lower price than other mechanisms, and thus is the dominant market price. For the color TV market, mechanism 3 (Rebate on retail price with monopolistic chain stores) is dominant cost factor. Following theoretical analysis, these results imply that an exclusive agent's cash constraint is so low that mechanism 4 can only realize a higher cost than mechanism 3. This may be true from the observation from the fieldwork: Even within the

same firm brand, the distribution channel was constructed separately and independently by product at the early stage. The channel was nurtured according to the nature of products: air-conditioners requires after-sales service to install products in each customer's house, but as color TVs are more like a commodity, the brand and store are not required to care about the product distribution or installation.

Table 9: Supply function

Dependent: price	Air-conditioner		TV	
Parameter	Estimate	Std.Err.	Estimate	Std. Err.
Price cost margin	.295	(.184)*	.271	(1.523)
Average Cost Index	.893	(.194)***	1.000	(0.043)***
Integration (Mechanism 2)	-40.0	(257.8)	1155.9	(668.1)**
Chain Store (Mechanism 3)	-274.3	(189.6)	-179.6	(928.0)
Exclusive Agent (Mechanism 4)	-306.2	(162.3)**	-14.6	(393.7)
Year dummy	+		+	
Brand	Gree		TCL	
	Haier		Haier	
	Hisense		Hisense	
	Midea		Changhong	
	Daikin		Sony	
	Panasonic		Panasonic	
	TCL		Konka	
	Kelon		Skyworth	
	Changhong		Samsung	
No. of obs.	3471		8009	
R-square	0.1642		0.1266	

Note: * p<0.1; ** p<0.05; *** p<0.01.Average cost index is generated Nevo(2000) that average of product price within the same brand and the same city.
Source: Author's calculation.

7   Conclusion

This study was conducted to understand how Chinese firms coped with the default risk of payment with inferior enforcement institutions. Although the legal institutions have

certainly improved, but their impact is limited to coping with default risk. Most of businessmen perceived that they were able to cope with the risk by adjusting their sales mechanism. Furthermore, this induces competition of the mechanisms. Firms in the industry gradually learned type of the more efficient mechanisms and imitated, thus the mechanisms converged into one type. Competition of mechanisms improved capacity to control risk of whole industry and compensated inferior enforcement institutions.

To examine this hypothesis in economics, I built simple contract models to describe each strategy and the competition among them, then empirically examined the market outcome induced by the model. The theoretical model reveals that although a heterogenous transaction arrangement was observed during this transitional period, an absolute "superior order" exists among the mechanisms observed: Two contract mechanisms are superior to spot transaction or integration in an environment where strategic default by a buyer is feasible. The two contracts realized the lowest cost in the environment with trade credit default risk.

These theoretical predictions were supported empirically. In order to evaluate a firm's strategy or mechanism, I employed a structural industrial organization approach. This approach allows us to explicitly distinguish the differences of mechanisms and their impact on supply behavior by sorting out demand factors and supply factors.

By this approach, we saw that sales mechanism were cost factors and determinants of the supply behavior of firms were the sales mechanism. Hence, the sales mechanism that generates the lowest cost was effective competition strategy for a firm to gain more profit and more sales, and due to this nature, the sales mechanism worked as a driving force for converging into a mechanism. In reality, Gree, who invented the a contract package with rebate on volume, down-payment from exclusive wholesaler, gained the Number 1 market share in 2007 in our data, and other brands, like Haier, Hisense and others imitated and introduced the mechanism.

The theoretical and empirical study in this paper documented how competition of the mechanism against payment default risk developed in China's transition period: firms who encountered default risk of deferred payment began to attempt the sales-mechanism, and the attempted mechanisms were selected and converged into the one that generates the lowest cost via pricing competition. This story implies why institutional arrangement payment

default is an effective instruments to promoting effective competition in a market economy.

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Chapter 3
Control Rights, Pyramids and Expropriation
of
State-owned Listed Enterprises:
Evidence from the dual class share reform in China[*]

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Abstract

Literatures of corporate governance claim that expropriation by controlling owner towards the listed firm emerges when separation of cash flow and control rights exist, and that the separation emerges when dual class shares or pyramiding corporate structures exist. In China, dual class share and pyramiding coexisted in listed companies until the dual share reform was implemented since 2005. Exploiting this good exogenous change in institution, which only resolve dual class share structure and pyramids remained, this paper tested how much the pyramiding allow the controlling owner to expropriate listed firm. Results show that: the larger control right and the smaller cash flow right are, size of expropriation becomes bigger; the expropriation is apparent for state controlled listed companies, though private owned firms do not. This is because level of control right ratio is higher than private though state firms's control-cash slow right ratio is larger than private one. While the dual class share reform weakened the power to expropriate, separation still remains and generates expropriation. Structural estimation shows the size of expropriation to be 7 to 8 per cent of total asset at mean. If the gone share one voteh principle were to be realized, asset inflation could be reduced by 13 percent.

Keywords: corporate governance, concentrated owner, expropriation, state owned enterprises, China
JEL classification Number: G32, G34 ,K22, P31, P34

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1 Introduction

In the gradualism transition process of Asian post-planned economies, the state sector still retains control over most of economic activity. This control may have prevented a collapse of institutions and also may have facilitated sound economic transactions so far. Because of this, the gradualism transition process has been evaluated highly because it has accomplished a gParato maintaining processh that has generated no loser in the society (McMillan and Naughton [1992], Lau and Qian, Roland [2000], Qian[2003]). Consistent with this evaluation, China, Viet Nam and Myanmar have enjoyed steady growth of their macro economies during the era of gradual reform. The presence of the state sector in these economies has remained substantial or has been increasing over the course of reform.

In China, state owned enterprises still have a substantial presence in the economic activity in the whole nation. Their corporate governance system has an apparently different nature from private one. Particularly, listed state owned enterprises have not only economic power but also have strong connection with politics. Therefore, their behavior is sometimes influenced by economically non efficient motives. For example, in a stock market, a controlling owner may abuse their controlling power by offending interests of minority owners for economically non-efficient motives. The German law system, that China also belongs to, provides that interests of controlling and minority shareholders should be distributed rigorously according to size of shares. However, literatures on agency problems between controlling and minority owners claim that controlling owner can expropriate assets of firms and offend interest of minority shareholders under certain types of governance structure. Dividend should be paid out according to shares in hand among shareholders. Controlling owner and minority owner is treated equally in the dividend policy. However, the controlling owner has another channel to enjoy extra benefit from the firm. He has a decision power on utilization of firm's asset that the minority shareholder does not have. Consequently they can abuse the firm for their private purpose. This happens at a cost of reducing formal profit of the firm, which reduces size profit to be paid as dividend. The literature points out that this expropriating behavior tends to emerge when the separation of control rights and cash flow right of controlling owners happens, then the separation emerges under "dual class share" system or "pyramiding" corporate structures, both coexisted in China until a share structure reform in 2005 started. This paper is motivated to document the expropri-

ation takes place if the separation of cash flow and control rights exists in the listed firms in China utilizing newly enumerated data on dual class share and pyramiding structures, and cash flow and control rights of whole listed companies in China for 2006 and 2007.

After the Chinese government saw several economic scandals that controlling owners pumped up resources of listed companies then led them to bankruptcy, she initiated a reform so called "discriminate share structure" of listed companies that aimed to "defrost" circulation of locked shares in 2005. Thanks to this reform, many listed companies were able to dissolve the dual class share structure that had been inducing "expropriation" and illegally occupying assets of others by controlling owners. However, the pyramidal ownership structure still remains, and it allows a controlling owner to expropriate a listed company. This paper follows the course of the literature on agency problems between controlling owners and minority owners, including the work of Fama and Jensen (1983) , Hart(2001), La Porta, de-Silanes and Shleifer (1998) , Bebchuk(1999), Bebchuk et.al (2000), Classen, Djankov, Fan and Lang (1999), Claessen, Djankov and Lang (2000), Faccio, Lang and Yong (2001), and Fan, Wong and Zhang (2005). The work presented here is new to above in the following ways: (1) This paper sets a behavioral model of expropriation by controlling owners over listed companies. Estimation is done based on this structural model. It allows us to check whether or not the expropriation occurred due to inflating total assets. (2) The structural model allows us to obtain structural parameters that measures size of expropriation. Newly complied data that can distinguish control right and cash flow right enabled us to estimate the parameters. (3) The first main finding is that expropriation via account receivables is very apparent for the state owned listed firms through the period of 1998 to 2007 that our data covers. (4) The second is that the larger control right and the smaller cash flow right, then the expropriation become bigger. That means the state owned listed enterprises show expropriation via the separation, though privately owned listed firms do not. (5) The third finding is that expropriation via the separation still exists even for a sample that already completed "discriminated share reform" because pyramiding structure still pertains. The paper is organized as follows: Section 2 includes description of literature on agency problems between controlling and minority owners and the institutional setting of China's equity market and corporate governance systems over listed companies. A simple theoretical model of expropriation by controlling owners is presented in Section 3

along with an empirical test hypothesis. Description of data and estimation strategies are given in Section 4, and Section 5 includes discussion of results. Conclusions are provided in Section 6.

2 Literature and Chinese Institutions

### 2.1 Literature on the Agency Problem of Concentrated Ownership

"Expropriating" behavior of concentrated owners is the main topic of recent corporate governance literature. Classic literature on corporate governance and ownership (such as Jensen and Meckling, 1976) has analyzed agency problems between management and owners. Recent literature has changed their focus onto structure among owners and conflicts of interests between owners. By observing data, we can find that distribution of ownership is strikingly different among economies. In the United States or Japan, most shares are diversified, and it rarely happens to recognize a concentrated owner with more than a ten percent share in a listed company. However, in most developing economies, each listed company has one concentrated owner or block of shareholders who can exercise overwhelming power over the management, and influences other minority shareholders. Agency problems between concentrated and minority shareholders may easily emerge. If both concentrated and minority shareholders focus on maximizing only monetary benefit from the company, their interests coincides with each other, and a conflict of interest between them will not emerge. However, such conflict of interest does occur often in the real world. Theoretical literature on corporate governance argues that this happens when a controlling owner has the motive to extract private (non-monetary) as well as monetary benefits under certain types of corporate or share structures (Bebchuk [1999], Bebchuk et.al [2000], Claessen et.al [2000]CFaccio, Lang and Yong [2001]).

The literature argues that the controlling owner will be able to exert stronger controlling power (control right) over the decision making of the listed company relative to the size of the shares (cash flow right) in their hand. This phenomenon is called "separation of cash flow and control rights", and researchers in the literature claim that this separation may emerge via the following three types of structure (Bebchuk et.al [2000]):

(a) Pyramiding. Formation of a corporate group by investing vertically, such as when

a holding company invests in its subsidiary and the subsidiary invests in its subsidiary and lets the second or third subsidiary list their shares and finances for the whole group. Pyramiding is common in Asian countries and is typical of large ethnic Chinese firms. It is the most commonly used mechanism for concentrating control in a controlling minority structure (La Porta, de-Silanes and Shleifer [1999]). Enumeration rule of cash flow right and control right under this structure are defined following La Porta, et.al (1999) and Bebchuk et.al(2000) as in Figure 1.

Figure 1: Cash Flow and Control Rights under Pyramiding

Cash Flow Right = $s_1 * s_2 + s_3$

Control Right = $s_2 + s_3$
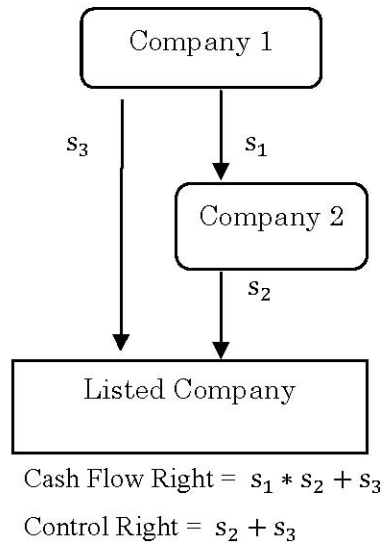
Source:Author.

(b) Cross-Holding. Shares are cross-held between member companies of a group in which the controlling right of a core or holding company in the group may be increased by each share. This is a famous and typical Japanese ownership style but rare in other Asian economies.

(c) Dual Class Share. Heterogeneous shares such as common and preferred stocks

Figure 2: Cash Flow and Control Rights under Dual Class Share
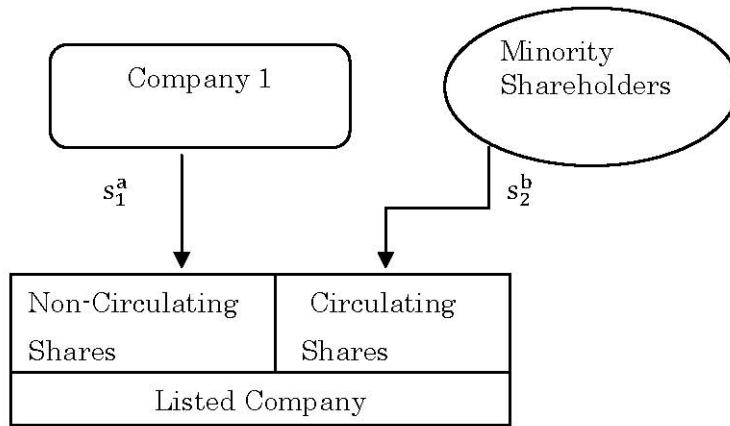
Cash Flow Right $= \frac{s_1^a}{s^a + s^b}$

Control Right $= \frac{s_1^a}{s^a}$

Source:Author.

coexist and give the controlling owner a stronger controlling right than the cash flow right in their hand (Figure 2). This is common in countries with French laws such as many Latin American economies. Most corporate laws in countries influenced by the German law system, including China, prohibit the listed companies from violation of the one share one vote principle. However, dual share systems existed in China until very recently.

2.2 Separation of Control and Cash Flow Rights in China

Institutional settings in China related to the controlling owner of listed firms are described in this section.

2.2.1 Concentrated Ownership Structure

Table 1 presents an international comparison of the distribution of control rights. The largest owners of listed companies in China hold about 35 percent of shares at mean and

median. The second largest owners only hold six percent at median and nine percent at mean. These statistics reveal that China belongs to a gconcentrated ownership structureh group together with France and/or Germany, and is different from a highly gdispersed ownershiph group such as the United States, United Kingdom, or Japan. This "concentrated ownership structure" is easily subject to controlling owners violating the interests of minority shareholders. In terms of ownership type, the state sector is the largest controller; this was 60 to 80 percent during 1999 to 2007 (Table 2).

Table 1: Concentrated Controlling Owner: International Comparison

country	year	no.of company	Largest share holder				2nd Largest				3rd largest			
			min	median	mean	max	min	median	mean	max	min	median	mean	max
China	2000	1318	2.1%	44.6%	45.2%	88.6%	0.0%	5.3%	8.4%	42.4%	0.0%	1.9%	3.3%	24.8%
	2007	1518	0.8%	34.3%	36.0%	95.0%	0.1%	6.4%	8.9%	42.4%	0.0%	2.5%	3.6%	24.3%
France	-	-	0.0%	20.0%	29.4%	72.7%	0.0%	5.9%	6.4%	19.7%	0.0%	3.4%	3.0%	8.5%
Germany	-	372	0.0%	57.0%	49.6%	100.0%	0.0%	0.0%	2.9%	45.2%	0.0%	0.0%	0.6%	32.0%
UK	-	207	3.4%	9.9%	14.4%	78.9%	3.0%	6.6%	7.3%	26.3%	3.0%	5.2%	6.0%	25.7%
United States														
NYSE	-	1309	0.0%	5.4%	8.5%	92.9%	0.0%	0.0%	3.7%	40.1%	0.0%	0.0%	1.8%	25.0%
Nasdaq	-	2831	0.0%	8.6%	13.0%	99.5%	0.0%	0.0%	5.7%	48.8%	0.0%	0.0%	3.0%	24.1%

Source: China: Sinofin Database. Others: OECD, Corporate Governance: A Survey of OECD Countries, 2001, Table 1.1

Table 2: Ownership Types by Ultimate Controlling Owner

	State		Private		Foreign		Collective		NPO		Union		Unknown		Total
1999	762	83%	70	8%	9	1%	31	3%	8%	1%	7	1%	32	3%	919
2000	1075	82%	129	10%	10	1%	38	3%	7	1%	10	1%	49	4%	1318
2001	962	81%	125	11%	9	1%	37	3%	6	1%	8	1%	38	3%	1185
2002	919	77%	185	16%	10	1%	28	2%	5	1%	8	1%	11	1%	1190
2003	912	73%	268	21%	8	1%	28	2%	7	1%	8	1%	11	1%	1250
2004	924	69%	349	26%	7	1%	23	2%	20	1%	12	1%	2	0%	1337
2005	924	69%	371	28%	6	0%	16	1%	5	0%	13	1%	1	0%	1336
2006	912	65%	453	32%	7	0%	17	1%	5	0%	15	1%	4	0%	1413
2007	919	61%	530	35%	10	1%	28	2%	4	0%	13	1%	1	0%	1518

*Source:*Sinofin Database.

2.2.2 Dual Class Share in China: Discriminated Shares

In most civil law, particularly German law related economies, companies are prohibited from violating the "one share one vote principle". Company law in China also includes similar provisions. However, for listing companies, the government imposes a restriction on the circulation of particular types of shares.

The Chinese government has been reluctant to circulate control rights of firms, particularly those of large companies like listed ones, because the government was afraid of they are out of control under transitional nature of institutions. In the early 1990's, the government introduced discriminative control over the shares of listed companies. Shares were classified into: (1) state shares, (2) corporate shares (state owned corporation and other corporate shares), (3) individual shares, and (4) foreign shares. Each classification sets different control from the government. State shares (1) and state corporate shares (a part of (2)) are called "state owned shares." In the late 1990's, when massive numbers of old type SOE's started being transformed into "limited share corporations" (corporations under company law), the government demanded that "state owned shares" be the controlling shares, ideally more than 50 percent but at least 25 percent. State shares ((1)) were allowed to be sold and bought between state and private sectors but this also required permission of the State Asset Committee in addition to decisions at board meetings inside the company. State shares ((1)) and corporate shares ((2)) were prohibited from being transacted on the security market according to several administrative guidelines[1].

2.2.3 Pyramiding in China

As in other economies in Asia, pyramiding is very prevalent in China. Listed companies are often owned and controlled by intermediate companies called "holding companies" or "jituan gongsi"(a direct translation is "group company"). Most listed companies have been established in order to function as a financing channel for the corporate group or controlling owner, particularly for the companies listed in the early period. Companies that run the

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[1]Institutions were structured based on the following administrative documents: 1992 May, 15th,"Procedure on Experiments to Introduce the Limited Share Company", "Opinion on Introducing the Share Limited Company". 1993 April, 22nd, "Provisional Ordinance on Management of Issuing and Transaction of Share." 1994 March, 11th "Provisional Procedure of Treatment of State Owned Shares in Share Limited Company Experiments". 1994, November 3rd,"Provisional Procedure of Treatment of State Owned Shares in Share Limited Company" (See, Nomura Capital Market Research 2008)

Table 3: Discriminated Share

	2000		2007
Non-Circulating Shares	56%	Restricted Circulation Shares	52%
Corporate Proposer's Share	47%	State and SOE shares	52%
State shares	36%	State shares	33%
Domestic Corporation Shares	10%	SOE shares	9%
Foreign Shares	1%	Foreign Shares	1%
		Foreign Corporation Shares	1%
		Foreign Individual Shares	0%
Non Proposer's Non-Circulating Shares	9%	Other Domestic Corporation Shares	8%
Invited Corporation	6%	Domestic Individual Shares	1%
Employee	1%	Other Non-Circulation Shares	1%
Preferential/Other Shares	2%		
Circulating Shares	44%	No-restriction shares	48%
A shares	41%	A shares	22%
B shares	3%	B shares	1%
H shares	1%	H shares	25%
		Free Circulation Shares	0%
Total Share Numbers(Bil)	330.78	Total Share number(Bil)	3,478.6
	100%		100%

Source: Sinofin Database.   *Notes*: 1) See the text for definition of Non-Circulating and Circulating Shares. 2) A shares are listed in Shanghai or Shenzhen Stock Exchanges and transacted among only Chinese nationals. B shares are listed on the Shanghai or Shenzhen Stock Exchanges and transacted exclusively among foreigners. H shares are listed on security markets abroad such as Hong Kong and New York.

actual business do not have their shares public in the equity market. In China, all listed companies are required to disclose detailed information regarding their ultimate controller and pyramidal ownership structure on the annual financial statement about. Specifically, graphs depicting pyramid structures have been disclosed since 2001. Thanks to the discloser on this information, a researcher can accurately trace the number of pyramid layers and can enumerate the size of cash flow and control rights. This paper enumerates this information to quantify separation of cash flow and control rights of Chinese listed firms.

2.2.4 Data on Pyramid Layer, Cash Flow and Control Rights of listed companies in China

Research on the presence of separation among controlling and cash flow rights in China are accumulating now. Teneve et.al (2002) tried to document and measures the size of separation during the time when disclosure of information on the whole pyramidal structure was not formally required. Based on their original survey to 257 firms it was found that listed companies in the Shanghai Exchange, non-circulating shareholders, state, legal persons and employees dispatched 72 out of 76 directors of surveyed companies. They claim that, if this number can be regarded as a proxy of control rights, non-circulating shareholders held 95 percent of control rights, this in contrast to their cash flow share of 70 percent. They asserted the existence of separation of control and cash flow rights. Fan, Wong and Zhang (2005) were the first to document the number of pyramid layers for a sample of newly listed companies. They also measured the size of control and cash flow rights based on the layer structure. Their data shows that for about 60 percent of the firms that were going to issue their shares for the first time, the number of pyramid layers was two on average. Pyramid layers are thicker for privately controlled firms than for government controlled firms. The ratio of cash-flow to control rights is higher for government controlled firms (.97) than for privately controlled firms (.54).

Our data for this paper used includes exact figures cash flow and control rights information. It is enumerated based on information of pyramidal ownership structures for the all listed companies for the 2006 and 2007 (Table **??**). The data shares a similar tendency with above literature. The number of pyramids for privately controlled firms (2.5 at mean) is larger than that of state controlling firms (2.4 at mean). The ratio of cash-flow to control rights of privately controlled firms (.70 at mean, .76 at median) is lower than that of state controlled firms (.90 at mean and 1 at median).

However, level of control right ratio, that directly determines power to expropriate, is higher for the state owner listed enterprises (.39 at mean in 2007) than the privately owned firms (.28 at mean). Literature on agency problems between controlling owners and minority share holders has discussed agency problems among privately owned firms. However, this agency problem may occur in state owned firms as well if there are private benefits of controlling owners and the corporate structures mentioned above. Case studies

in China reveal that listed companies under the state sector have gone bankrupt as a result of expropriation via accounts receivable. One example is given in the next section.

Table 4: Cash Flow Right, Control Right and Number of Pyramid Layers of all Listed Firms

	Obs	mean	std. dev.	min	median	max
2007 All Listed Firms						
Number of Pyramid Layers	1542	2.3	0.9	1	2	7
Cash-flow Right	1542	0.33	0.17	0.01	0.30	1.0
Control Rights	1542	0.38	0.16	0.05	0.37	1.0
Cash-flow Right/Control Right	1542	0.84	0.24	0.06	1.0	1.0
2006 All listed firms						
Number of Pyramid Layers	1432	2.3	0.8	1	2	7
Cash-flow Right	1431	0.32	0.17	0.01	0.30	0.99
Control Rights	1432	0.38	0.15	0.07	0.36	0.99
Cash-flow Right/Control Right	1431	0.83	0.25	0.05	1.0	1.0
2007 State Controlling Firms						
Number of Pyramid Layers	792	2.4	0.8	1	2	6
Cash-flow Right	792	0.35	0.16	0.02	0.34	0.84
Control Rights	792	0.39	0.15	0.05	0.39	0.84
Cash-flow Right/Control Right	792	0.38	0.15	0.04	0.37	0.84
Share of the largest owner	792	0.38	0.15	0.04	0.37	0.84
2007 Privately Controlling Firms						
Number of Pyramid Layers	361	2.5	0.9	1	2	7
Cash-flow Right	361	0.23	0.14	0.01	0.20	0.78
Control Rights	361	0.31	0.14	0.09	0.28	0.91
Cash-flow Right/Control Right	361	0.70	0.27	0.06	0.76	1.00
Share of the largest owner	361	0.30	0.13	0.05	0.27	0.78
2007 Reform Complete Firms						
Number of Pyramid Layers	1192	2.4	0.82	1	2	7
Cash-flow Right	1192	0.31	0.16	0.06	0.29	0.84
Control Rights	1192	0.37	0.15	0.05	0.36	0.91
Cash-flow Right/Control Right	1192	0.83	0.24	0.01	1	1
Share of the largest owner	1192	0.35	0.15	0.04	0.34	0.84

Source: Sinofin Database.

Notes: 1) 2007 data includes information for companies that were in preparation for listings but not yet issuing shares. Therefore, for some corporation, control and cash flow rights are reported as 100 per cent though regarded listed company. 2) The sample of state controlling and privately controlling firms does not include all listed companies, but only the ones used in estimation are presented here.

2.3 Expropriation via Accounts Receivable: The Case of Jinan Qingqi Motorcycle

Jinan Qingqi Motorcycle, a state controlled company under the Jinan Municipal City government, Shangdong Province, was the number one company in the motorcycle market of China and one of the most active emerging companies in the 1990fs. In its annual report of 2001, the Jinan Qingqi Motorcycle, Co. Ltd. auditor announced that judgment regarding a part of accounts receivable and loan guarantees toward the holding company of China Qingqi Motorcycle Group Company, the controlling owner of the listed company, would be withheld. The listed company focused on production of motorcycles, and it depended on the China Qingqi Group Company, the holding company of the group and controlling owner of the listed company, for purchase of materials or patented technology and sales of goods. The listed company was heavily dependent on the holding company and in sales reached 45 percent of the total (Jinan Qingqi Motorcycle Co. Ltd. 2000 Annual Report, p. 14). In 2001, accounts receivable of the holding company totaled 2.47 billion RMB and for the subsidiary company in the group .343 billion RMB. It reached 62 percent of total assets, and total accounts receivable of the company were 63 percent of total assets. The auditor asserted in the annual report in 2001 that there was little prospect that the accounts receivable would be repaid until a substantial reconstruction of the holding company starts. The auditor also claimed that the listed company had made a guarantee to the holding company and subsidiaries in the group regarding bank loans amounting to 739.86 million RMB; 471.57 million of this was in default by the end of 2001. The company turned deficits for two years from 2000.

Table 5 presents the development of accounts receivable for the holding company as well as profit, sales, and assets of Jinan Qingqi Motorcycle. The auditor's claim ignited a de facto bankruptcy process organized by the government. In 2003, The Jinan Municipal City Government, the ultimate controller of the listed company, announced a commitment to reduce the non-performing accounts receivable .6 to .8 billion RMB. This came to three times the total assets of the listed company in 2002. The Jinan Government simultaneously started to look for new investors who would merge the motorcycle production department (Jinan Qingqi Motorcycle Co. Ltd., Annual Report 2003, pp.19-20)[2] This incident is a

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[2]Finally, the listed company sold out to state owned enterprises under the central government, the China Armament Industry Group in 2008. Jinan Municipal Government sold all shares of the company, 40.9

typical case in which a holding company expropriated assets of a listed company via accounts receivable. In China, accounting items relating to trade credit are often used as channels of expropriation. If listed firms have accounts receivable related to some entity that are not settled for a long time, the entity expropriates cash of a given listed company. In this case, assets of the listed company look large, but the expropriating part is non-performing and is a dead asset. The exact fraction that has been expropriated may be unobservable, but this dead asset is a part of the accounts receivable presented on the balance sheet of the listed company. Expropriation may also go in the opposite direction. If listed company does not make settlement of accounts payable to some firm for a long time, the listed company may expropriate their trading partner. This expropriation becomes a part of accounts payable of the listed company's balance sheet. Thus, expropriation of the listed company may be hidden in some accounting items on the asset side of the balance sheet (Regarding structure of balance sheets, see the conceptual explanation in Figure 2). Particularly in China, direct lending between firms was legally prohibited even in 2010. Trade credit has been functioning as an alternative to inter-firm lending and has become a channel of gasset expropriation,h and expropriation via accounts receivable has brought about bankruptcy of some listed companies.

Table 5: Financial Status of Jinan Qingqi Motorcycle 1998-2003

	Account Receivable	to Holding Company	to HC (accumulated)	Guarantee to Holding Company	Profit	Sales Mil. RMB	Total asset Mil. RMB
1998	53.4%	n.a.	n.a.	n.a.	14.5%	1,950	3,290
1999	61.0%	16.9%	58.1%	n.a.	0.9%	902	3,850
2000	62.7%	31.6%	61.6%	n.a.	-6.6%	534	4,150
2001	71.4%	35.9%	77.2%	13.6%	-20.7%	643	3,460
2002	14.9%	64.4%	316.7%	75.5%	-357.1%	661	954
2003	16.4%	30.8%	105.8%	0.0%	0.9%	983	2,029

Source: Sinofin Database for 1998-2003, Annual Report of Jinan Qingqi Motorchcle Co. Ltd..
Notes: 1) There are normalized by total assets if not noticed. 2) Ultimate owner shares remained at 40.9 per cent during the whole period in the table.

Figure 3: Channels of "Expropriation"
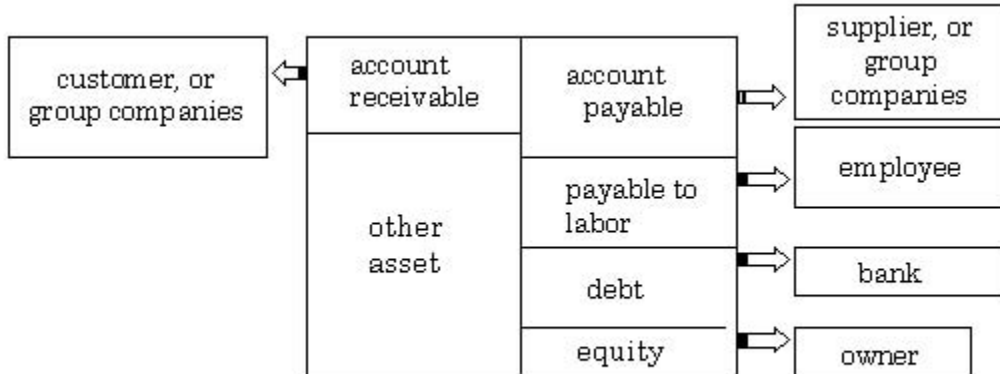
2.4 Discriminated Share Reform since 2005

In the early 2000's, defects of "discriminated shares" and the presence of large blocks of concentrated owners, particularly in the background of state sectors in the stock market, became apparent. Expropriation via inter-firm transactions as in the case of Jinan Qingqi as well as various types of negative behavior by controlling owners became apparent. There was misuse of cash collected from minority shareholders without their consent. In one extreme case, dividend payments were paid in cash to shareholders immediately after a new increase in capital where that of most controlling owners did not increase but was just collected from minority shareholders. In this case, if the controlling owners had 60 percent of shares, they automatically received 60 percent of the cash collected from minority shareholders. In order to dissolve the unequal position of controlling and minority shareholders, and to realize the principle of "one share, one vote, one price," the government announced that it would take steps to correct discrimination among the shares[3].

Government reform demanded that each listed company negotiate among shareholders regarding how to compromise the interests of circulating and the non-circulating share-holders in order to allow non-circulating shares to circulate. Each listed companies held a

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[3]Committee of Security Regulation China, "Guidance on Experiment on Reform Discriminated Share" in 29 May, 2005.

shareholder meeting and reached agreement on a scheme that would allow compensation from non-circulated to circulating shareholders. In most cases, circulating share holders were compensated by receiving additional shares free of charge. 66 percent of the reformed company gave the shares held by non-circulated owners to circulated owners, and 15 percent of the cases showed an increase in capital placed free of charge to circulating share holders (Nomura Institute of Capital Market Research, 2007). Through negotiation, over compensation schemes benefiting minority shareholders, the hidden legacy of past management that had piled up in the accumulation of non-performing accounts receivable assets, and a new scheme to write off non-performing assets, were discussed simultaneously.

In the empirical study reported below, a simple behavior model is developed to capture expropriation behavior by inflating assets such as utilizing accounts receivable. Empirical test are then done to test whether or not expropriation has actually occurred, particularly after discriminated share reform was completed. Our data implies that privately controlled firms have more pyramid layers and larger separation of control and cash-flow rights in China. In the literature so far, few argues through which channel expropriation takes places. Classens Djankov, Fan, and Lang (1999) regressed separation of control and cash flow rights on market valuation change. However, they did not set a behavioral model. Expropriation or private consumption of assets by controlling owners is to some extent traceable through financial statements. Because listed companies cannot throw away money with no record, these firms accomplish their negative behavior by hiding in some accounting items on the financial statements that are used as channels of expropriation.

3   Empirical Framework

3.1   A Model of Expropriationh by Asset Inflation

Here, I present a behavioral model of this empirical study. A listed firm has two heterogeneous owners: controlling owner and minority owners. Manager of the firm completely follows decision by the controlling owner. Though the corporate law of China provided to maintain "one share one vote" principle, there is a difference in power influencing over decision making on firm. Under this setting, controlling owner can "expropriate" the asset of listed firm for the private purpose of controlling owner. There exists informational asymmetry between controlling owners and minority owners over decision by the controlling

owner.

A controlling owner of listed company will decide a level of asset size, by solving following constraint maximization problem, consequently level of profit to be paid out as dividend is determined. The decision by controlling owner matters interests of minority shareholder. The objective function consists of monetary benefits from share holding and private benefits via expropriation. The former is represented in the first term of objective equation in model (1) which represents dividends according to owner cash flow rights. The latter is seen in the second term which includes private benefits gained via "expropriation." The constraint equation in the model (1) describes factors of profit distribution to the stake holders. This is assumed to be the sum of actual disbursements of interest payments to debtors and dividends to shareholders.

$$Max_K \qquad \varphi[f(K) - rK - ex(K)] + P[ex(K)]$$
$$subject\ to\ rK \quad = \quad qE + iD$$

where φ is share of cash flow right held by the controlling owner $(0 \leq \varphi \leq 1)$. K is capital or total assets of the company, Y is turnover, and r is the profit distribution for the investors. $f(K)$ is a production function that generates turnover using the input of total assets, $ex(K)$ is the "expropriation" function, and this is also assumed to be a function of total assets.

$$EX = ex(K) \equiv EXln(K). \tag{1}$$

Here EX is assumed to be a function of a fraction of particular accounting items on the balance sheet such as accounts receivable (AR) or accounts payable (AP): these are utilized as a channel of expropriation and size of total assets (K). $P(X)$ is private benefit from expropriation X: Here, it can be assumed that $P(X) \equiv PX(P > 0)$. P is a parameter to capture size of private, or non-economic, benefit for the controlling owner from expropriation. The first order condition for this problem is derived as follows:

$$f'(K) = r + ex'(K) - \frac{P}{\varphi}ex'(K) \tag{2}$$

This equation implies that marginal product to total asset K is equal to r, financing cost from shareholder and debtors plus "net marginal cost of expropriation" to K. When

total asset is increased for expropriation benefit, it decreases size of profit that paid out as dividend. Therefore, difference from gross benefit from expropriation ($ex'f(K)$) minus loss and gain from expropriation ($1 - \frac{P}{\varphi}ex'(K)$) becomes net marginal cost of expropriation.

In this empirical exercise, how to set functional form of expropriation and production functions is a key question. In order to check robustness of the claim that expropriation and separation of cash flow right and control right, author employed two different forms of expropriation function.

3.2   Expropriation via Accounts Receivable

The first specification takes a following rather strict assumption: (1) expropriation is done via "accounts receivable" terms. (2) To capture the relationship, we assume that both production function f (K) and expropriation function ex(K) takes the Cobb-Douglas form, which is reasonably flexible. Under this assumption, $f(K) \equiv aYlnK$ has a derivative of Y/K, $ex(K) \equiv bEXlnK$ has the derivative $ex(K)$ on K as EX/K. As we assume that expropriation is α per cent of accounts receivable (AR), expropriation can be formalized as

$$EX = \alpha AR. \tag{3}$$

Plugging equation (3) and Y/K as derivative of $f(K)$ into equation (2), testable equations are derived as follows:

$$
\begin{aligned}
a\frac{Y}{K} &= r + ex'(K) - \frac{P}{\varphi} = r + b\alpha\frac{AR}{K} - Pb\alpha\frac{AR}{\varphi K} \\
\frac{Y}{K} &= \beta_0 r + \beta_1\frac{AR}{K} - \beta_2\frac{AR}{\varphi K} + \xi_{it} + \epsilon_{it}
\end{aligned}
\tag{4}
$$

where, $\beta_0 = 1/a$, $\beta_1 = b\alpha/a$, $\beta_2 = Pb\alpha/a$. φ is cash flow right ratio of the controlling owners. ξ_{it} is unobservable motivation to expropriate, and ϵ_{it} represents other unobservable factors. Here, the first order condition implies following economic relationship: (1) If terms with $ex'(K)$ were statistically insignificant and only r is significant, the size of total assets of the company would be at the socially efficient level. This would be free from any waste for expropriation by the ultimate owner. (2) If the coefficients of ex'(K) , particularly β_2, were confirmed to be statistically significant, effective financial cost for the controlling owner would be lowered, and the assets of the firm is excessively and inefficiently increased. In this case, expropriation by the controlling owner emerges at a cost of the violation of minority shareholderfs interests.

3.3 Expropriation due to Separation of Control and Cash-Flow Rights

The second specification takes more general form of expropriation by focusing on a relationship that separation of control and cash flow rights allows expropriation out of firmfs assets if private benefit exists. Literature related to agency problems of concentrated ownership indicates that separation of control and cash flow rights allows a concentrated owner to achieve expropriation to gain private benefit. This relationship is taken into consideration.

To make this relationship tractable, here we assume that size of expropriation is a function total asset and control power of controlling owner:

$$EX = ex(K, \rho) \equiv BK^{\alpha_1} g(\rho)^{\alpha_2} \tag{5}$$

$\rho(0 \leq \rho \leq 1)$ is the ratio of "control right" of the ultimate controllers; this is the sum of shares controlled by the ultimate controller. Here, we assume $P(X) \equiv X$ instead of $P(X) \equiv PX$ to make the test equation operational. Researcher does not know an exact form of ρ, $g(\rho)$. Furthermore, we set $g(\rho) = 1 - 1/\rho$ because it enable us to easily interpret relationship between control right and cash flow right. By inserting equation (5) in the first order condition for the controller(eq.(2)), the test equation becomes,

$$f'(K) = r + (1 - \frac{1}{\varphi})ex'(K) = r + (1 - \frac{1}{\varphi})B\alpha_1 K^{\alpha_1 - 1}(1 - \frac{1}{\rho})\alpha_2. \tag{6}$$

Economic implication of this equation is basically same as equation (4): marginal product to K is equal to financing cost r minus net marginal cost of expropriation. The specification here presume that expropriation happens if control right is bigger and cash flow right is smaller. Based on this relationship, if $\rho > \varphi$ happens, that is, separation of control right and cash flow right happens, unit benefit of expropriation is big compared to unit cost of expropriation, asset inflation for expropriation appears. If separation of cash flow right and control right does NOT happen, that is, $\rho = \varphi$ holds, and further if coefficient of control right term $\alpha_2 = -1$, net cost of expropriation become completely independent to cash flow and control rights. As long as $\alpha_2 < 0$ holds, the bigger control rights and the smaller cash flow rights, that is the separation of cash flow and control right is bigger or level of control right bigger, expropriation becomes bigger. If $\alpha_2 > 0$, expropriation becomes increasing functions of control right and cash flow right simultaneously. In this case separation of cash flow and control rights will decreases expropriation. To test relationship between cash

flow right and control right to expropriation, test equation is reduced from equation (4) by moving r to left side of the equation and taking logarithms from equation (6):

$$ln(\frac{Y}{K} - r) = ln\,B\alpha_1 + ln(1 - \frac{1}{\varphi}) + (\alpha_1 - 1)ln\,K + \alpha_2 ln(1 - \frac{1}{\rho})$$

As the term $1 - \frac{1}{\varphi}$ takes negative values by definition, logarithms cannot be taken. By replacing $ln(1 - \frac{1}{\varphi})$ with $ln(1 - \frac{1}{\varphi}) = ln(\frac{1}{\varphi} - 1) + ln(-1)$ and letting $ln(-1)$ be included in the error term, expropriation function equation becomes estimable as follows:

$$ln\frac{Y}{K} - r) = \beta_0 + \beta_1 ln(\frac{1}{\varphi} - 1) + \beta_2 ln\,K + \beta_3 ln(\frac{1}{\rho} - 1) + \xi_{it} + \epsilon_{it}, \qquad (7)$$

where $\beta_0/\beta 1 = lnB\alpha_1, \beta_2/\beta_1 = \alpha_1 - 1, \beta_3/\beta_1 = \alpha_2$. ξ_{it} is the unobservable that affect motivation to expropriate, and is independent unobservable factors again. Prediction of this test equation summarize as follow: If $\alpha_2 = \beta_3/\beta_1$ is estimated to be negative, it means separation of cash flow and control right increases expropriation, and if it is positive, vice versa.

4 Data and Estimation Strategy

4.1 Data

Data from financial statements of all listed companies in China was used and compiled by Sinofin Information Services, China Center for Economic Research, Peking University. The database supplied the information available from 1994 to the present. Financial statements of all listed companies in China from 1998 to 2007 were used. Information on ownership and corporate governance characteristics were also available for the period of 1998 to 2007. In addition to this ready-made data, data on control rights and the number of pyramid layers between the listed firms and ultimate controllers were enumerated based on the definition in Section 2. Cash flow rights for 2006 to 2007 were obtained from disclosed information on pyramidal ownership structure in annual reports of all listed firms.

Table 6 provides summary statistics of key variables. Y represents sales of the main operation, K the total assets, and r the profit distribution of investment for the owner. The profit distribution of the stakeholder represents the financial cost that firms would pay

20

for debtor and shareholders[4]. As variables for channels for "expropriation" by controllers, it is ideal if exact values of accounts receivable to the holding company (the ultimate owner) can be used. These figures have been required in the financial statements of all listed companies, at least since 2001. However, samples of this data are limited in availability and contradict one another relative to year-to-year financial statements. Further, this value is missing for many firms. Therefore, we gave up using the account receivable to the holding company, but used accounts receivable as a whole. Other than these variables appearing in the theoretical model, the followings were added as control variables: (1) year dummies, (2) type of ultimate ownership dummies, and (3) a share reformed dummy.

4.2 Source of Endogeneity and Identification Strategy

Estimation here is interested in estimating correct size of expropriation. In order to accomplish this target, I need to correctly estimate the structural parameters above. Equations (4) and (7) are the test equations to be identified, which describe rules on how the controlling owner balances his private expropriation motive and a formal profit distribution policy. In (4), account-receivables is the channel for expropriation of controlling owner. Account receivable for expropriation motives reduces profit substantially, as the case of Jinan Qingqi shows. Therefore, it is presumably correlated with unobservable expropriating motivation . At the same time, size of profit distributed to debtor and shareholders is also correlated with the expropriating motivation . The profit distribution to the stake-holders r is endogenous here. In (7), expropriation is facilitated/constraint by configuration of cash flow right and control right, and it is represented in a part of total asset when expropriation is realized. Therefore, lnK is endogenous here. As we have endogenous variables in the test equations, the equations are estimated by instrumental variables instead of ordinary least squares.

4.3 Instruments

In order to remedy endogeneity explained above, I need the instruments that are correlated with r or lnK, but are not correlated with error terms. What is the exogenous variation that identifies this expropriating action? I exploited a nature of time structure between formal

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[4]This consists of following accounting items: (1) financial expense, including payment to debtors and others related to financing activity plus (2) loss or profit for minority shareholders plus (3) profit to the ordinary owner plus (4) profit to the preferential owner.

Table 6: Summary Statistics of Key Variables

	Obs	mean	std. dev.	min	max
Total sample					
Turn over/ Total asset	10478	0.61	0.51	-0.08	10
Profit paid to stake-holders/ Total asset	10478	0.03	0.02	-0.08	0.49
Accounts Receivable/ Total asset	10478	0.19	0.13	0.00	1.18
Debt Asset Ratio	10478	0.49	0.37	0.00	16
Share of 1st largest owner	10461	0.42	0.17	0.01	1
Share of 2nd largest owner	10461	0.09	0.08	0.00	1
Share of 3rd largest owner	10461	0.03	0.04	0.00	0.25
Share-reform completed	10478	0.24	0.43	0	1
Sample with Cash-Flow and Control Rights and Number of Pyramid Layer (2006-07)					
Turn over/ Total asset	2454	0.72	0.60	-0.02	10.02
Profit paid to stake-holders/ Total asset	2454	0.02	0.02	-0.07	0.49
Accounts Receivable/ Total asset	2454	0.17	0.12	0.00	0.99
Debt Asset Ratio	2454	0.55	0.37	0.00	7.33
Number of Pyramid Layers	2454	2.36	0.80	1	7
Cash-Flow Rights	2454	0.31	0.16	0.01	0.84
Control Right	2454	0.37	0.15	0.05	0.91
Share of 1st largest owner	2451	0.36	0.15	0.04	0.84
Share of 2nd largest owner	2451	0.08	0.08	0.00	0.42
Share of 3rd largest owner	2451	0.03	0.03	0.00	0.24
Share-reform completed	2454	0.94	0.23	0	1
Dummies by ownership types					
State	2454	0.66	0.47	0	1
Private	2454	0.30	0.46	0	1
Foreign	2454	0.01	0.08	0	1
Collective	2454	0.01	0.12	0	1
NPO	2454	0.00	0.05	0	1
Union	2454	0.01	0.10	0	1

Source: Sinofin Database.

financial structure and expropriating decision; profit distribution to the stake holders and size of total assets are affected by both the requirement that is contingent to formal financial structure and the expropriation motives. But, usually the former precedes to the latter. Thus indices such as debt and the shares of owners are correlated with r or lnK, but not with error terms, because they are independently determined to expropriation motives, thus

we can expect them to work as instrumental variables[5].[6]

5 Results

5.1 Expropriation via Accounts Receivable as it exists for State Controlled Companies

Table 7 displays results of the estimates of "expropriation via account receivable" equation (4).Comparisons among OLS and fixed effect reveal that the fixed effect estimator corrects overestimation due to time invariant factors, but it got underestimated due to lack of care for the endogeneity problem in decisions on total asset size. GMM estimates indicate that expropriation by the controlling owner occurred for the state owned firms even after the reform of discriminated shares was completed. Private owned firms show a weak effect of expropriation when I do not distinguish the effect of the discriminated share reform. Estimation of a spline function was used to capture the impact of discriminated share reform. Lower column of Table 7 shows the results. They indicate that a state controlled firm, even those who completed discriminated share reform, are suffered from expropriation by the controlling owner, though size of coefficients get smaller. Though the discriminated share reform reduced expropriation to some extent, but not resolve the problem completely. For private firms who completed share reform, expropriation via accounts receivable disappeared. This means that expropriation has not yet disappeared because the pyramidal ownership structure still remains. We further test this in more general form of specification; that is, specification of "expropriation due to separation of control right and cash-flow right" (equation 7).

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[5]Modigliani-Mirror theorem proposed that financial structure do not affect the firms value (represented in total asset size or profit) if the following three factors do not hold:(1) asymmetry effect of bankruptcy to debtor and shareholder, (2) asymmetry effect of tax policy, (3) incentives of management. Idea to find instruments variable here depends on the assumption that (1) and (2) factors are independent to (3) incentive bias of management, the main interest of this paper.

[6]7 Endogeneity tests of instruments variables (Ho= IV are exogenous) are not rejected for general form, but rejected for expropriation via account receivables. See Table 7 and 8.

Table 7: Expropriation before/after Share Reform: Model 1 ex(K)=AR ln(K)

Dependent: Y/K	(1)		(2)		(3)		(4)		(5)		(6)	
Estimator	OLS		FE		GMM		GMM		GMM		GMM	
No. of obs	10461		10461		10461		10461		2454		2454	
Period	1998-07		1998-07		1998-07		1998-07		2006-07		2006-07	
	coef	s.e.	coeff	s.e.	coeff	s.e.	coeff	s.e.	coeff	s.e.	coeff	s.e.
Rental fee of capital	2.6	(0.2)***	0.8	(0.1)***	24.7	(3.2)***	29.3	(3.4)***	28.4	(10.1)**	19.7	(10.7)***
Expropriation = AR/K	1.4	(0.1)***	0.0	(0.1)	0.0	(0.3)	0.52	(0.11)***	-0.34	(0.8)	-0.89	(0.7)
Expr*1/share	0.0	(0.0)	0.0	(0.0)	0.0	(0.3)			-0.02	(0.0)***		
Expr*SOE	0.6	(0.1)***	-0.1	(0.1)	0.9	(0.1)***			1.26	(0.3)***		
Expr*SOE*1/share	-0.1	(0.0)***	0.0	(0.0)**	-0.1	(0.0)***			-0.02	(0.0)**		
Expr*others	0.2	(0.1)	-0.2	(0.1)**	0.4	(0.2)*			0.93	(1.4)		
Expr*others*1/share	-0.1	(0.0)**	0.0	(0.0)	0.0	(0.0)			-0.09	(0.1)		
Expr*Reformed							1.07	(0.43)**			-0.01	(0.8)
Expr*Ref*1/share							-0.26	(0.09)**			-0.02	(0.0)
Expr*Ref*SOE							1.73	(0.34)***			1.3	(0.3)***
Expr*Ref*SOE*1/share							-0.24	(0.06)***			-0.02	(0.0)**
Expr*Ref*others							2.13	(1.76)			0.38	(1.8)
Expr*Ref*others*1/share							-0.21	(0.28)			-0.07	(0.09)
Endogeneity test					99.9		161.5		23.7		25.6	
					p=.00		p=.00		p=.00		p=.00	
Fit/Test of Over	0.59		0.06		35.8		8.1		1.3		1.0	
Identification			within		p=.000		p=.004		p=.718		p=.811	
Controlling owner variable	control		control		control		control		cashflow		cashflow	

Source:Sinofin Database. *Notes*:1) All regressions include year dummies and controlling owner type dummies. 2) Results of expropriation items x ownership reported linear combination of estimates of expropriation and *ownerships. 3) FE is fixed effect on each firm code. 4) Instruments for (3) and (4) are total debt (log) and shares of 1st largest owners, for (5) and (6) are total debt(log) and 1st to 3rd largest owners' share. 5) Due to limitation of data, share of controlling owner is "control right", not "cash flow right" for 1998-2007 period samples. For 2006-07 period sample estimation, control and cash flow right are distinguished each other.

24

5.2 Expropriation Due to Separation of Control and Cash-Flow Right

Table 8 includes results of two specifications of equation 4. Estimates in (1) specify control right itself, and in (2) it is specified as $1 - \frac{1}{\varphi}$. Results show the second specification fits more than the first one. Expropriation of the state owned listed firm is affected by configuration of cash flow and control rights as well as total asset size. The expropriation become larger when cash flow right is smaller,and control right is larger. This implies that the larger the separation between control right and cash flow right is, at the same time, the larger ratio of control right is, the larger the expropriation. This is a support for the literature that claims separation of cash flow and control right generates expropriation for listed state owned companies. The state owned listed enterprises shows expropriation because its level of control right is higher, though degree of separation is smaller than private firms. Contrary to the state owned firms, private owned listed firms shows opposite sings of coefficients for the cash flow right and that of control rights is not significant. Configuration of cash flow and control right does not affect expropriation of private owned firms.

5.3 Model Prediction and Counterfactual Simulation

As estimation is based on a structural model in this paper, it is possible to retrieve structural parameters of expropriation function, and ratio of expropriation out of expropriated account channels etc. The expropriation for the state owned enterprises is estimated to be 6.8 percent of total assets in the general form, and to be 7.8 per cent in the form that assume expropriation via account receivables. The equation of gexpropriation via account receivableh shows that expropriated ratio out of total account receivable (α) is 4.4 per cent, and private value, in other word non-economic value, of expropriation (P) is 1.7 per cent of total account receivables (Table 9). For private owned firms, the results showed a negative expropriation. Table 10 shows counterfactual simulations. They show how much expropriation would be reduced if separation of control and cash-flow rights is resolved, that is, control and cash-flow rights are completely identical for all sample firms. Excess investment, or asset inflation, may be reduced by about 13 percent for state controlled firms.

25

Table 8: Expropriation post Share Reform period

Dependent: Y/K				
	(1)		(2)	
Estimator	GMM		GMM	
No. of obs	2451		2451	
	coeff.	s.e.	coeff.	s.e.
ln K	-5.6	(3.67)	-4.74	(2.71)**
ln K*reformed	0.67	(0.36)**	0.63	(0.25)**
ln K*reformed*SOE	0.30	(0.14)**	0.25	(0.11)**
ln K*reformed*others	0.51	(0.7)	0.33	(0.50)
ln control right	2.4	(2.12)		
ln control right*reformed	0.81	(0.88)		
ln control right*reformed*SOE	-0.45	(0.64)		
ln control right*reformed*others	1.49	(5.07)		
ln(1/control right -1)			-1.79	(1.24)
ln(1/control right -1)*reformed			0.04	(0.12)
ln(1/control right -1)*reformed*SOE			-0.14	(0.08)***
ln(1/control right -1)*reformed*others			-0.51	(0.48)
ln(1/cashflow right -1)	0.98	(1.41)	1.6	(1.25)
ln(1/cashflow right -1)*reformed	0.02	(0.13)	-0.36	(0.20)*
ln(1/cashflow right -1)*reformed*SOE	-0.08	(0.24)	0.23	(0.08)***
ln(1/cashflow right -1)*reformed*others	0.03	(0.96)	0.22	(0.59)
Test of Over Identification	19.4	p=.0016	20.3	p=.0011
Endogeneity test	9.2	p=.0561	11.8	p=.0191
($H_0 = variables are exogenous$)				
Instruments	total debt(log) share of 1st to 8th owner		total debt(log) share of 1st to 8th owner	
First stage F value ($P > z$)				
ln K	0.00		0.00	
ln K reformed	0.00		0.00	
ln K reformed*SOE	0.00		0.00	
ln K reformed*others	0.12		0.27	

Source:Sinofin Database.   *Notes*:1) All regressions include year dummies and ultimate owner type dummies. 2)As estimates of expropriation items x ownership, linear combination of estimates of expropriation items and expropriation items x ownership dummies are reported.

Table 9: Size of Expropriation :Estimated ex(K)/K

Estimated	Obs	mean	std.dev	min	max	α	P
General Form							
State Owned	1541	.0683	.580	.00019	16.71		
Private Owned	738	-13.6	120.8	-2888	0		
Via Account Receivable							
State Owned	1541	.0783	.0763	1.36e-14	.455	.044	-.017
Private Owned	687	-.0240	.024	-.267	6.72e-15	-0.12	.067

Source: Sinofin Database for 1998-2003, Annual Report of Jinan Qingqi Motorchcle Co. Ltd..
Notes: 1) α in *Via Account Receivable* indicates fraction of expropriation in account receivables. 2) P indicates of fraction of private (non-monetary) benefit out of expropriation See text for details.

Table 10: Expropriation Function and Counter-factual Simulation

	State controlled firms	Private controlled firms
Structural parameters	$9.91e^{-16}K^{2.09}(1-\frac{1}{\rho})^{-0.6}$	$-1.95e^{16}K^{-0.76}$
Simulated ex(K)/Estimated ex(K): mean	.8699	.6384

Source: Sinofin Database for 1998-2003, Annual Report of Jinan Qingqi Motorchcle Co. Ltd..
Notes: 1) Parameter estimates of equation (2) in Table 8. 2) Multiplier terms are divided by the coefficient of term $(1-\frac{1}{\rho})$. 3) Simulation for the case if share of cash flow right is equalized to control right.

5.4 Discussion

Results here are satisfactory to test the existence of expropriation of listed firm by the state owner. Structural model enable us to measure the size of expropriation, its non-economic value for the controlling owner, and to implement counterfactual simulation. IV estimation instead of OLS drastically improved the measurement of coefficient. Existence of expropriation is robust for the listed firm under the state owners as all specification shows consistent results[7]. They tend to inflate asset for expropriating motives. Non-economic value of expropriation, such as expropriation for political motives, is not negligible (1.7 per cent of expropriated items). As most of the state owned enterprises are subject to political

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[7]Size of expropriation based on OLS generates unrealistic figures; expropriation amounted to 226 per of total assets, and fraction of expropriation from account receivable amounted to 128 per cent of account receivable.

guidance by the state asset management committees or the government as a whole under the current corporate system, this result should be noted. Policy implications here are as follows: (1) the state owned listed firms should be the target when the regulatory agency implement minority share holder. (2) Resolution of separation of cash flow right and control right, such as listing of ultimate controller itself, is effective to reduce expropriation. Result of privately owned firm is slightly puzzling. Descriptive data shows that private owned firm has longer layer of pyramid, smaller cash flow to control right ration. But the estimation results shows that their expropriation is negative, asset deflation happened to the privately owned firms of Chinafs listed firm. The result might be attributed to low level of control right ratio for private owned firms[8].

6   Conclusion

Empirical evidence presented in this paper indicates that "expropriation" exists for the state owned listed firm in China, and it amounted 7 to 8 per cent of total assets in average. If we assume that expropriation is done via account receivable, its size is about 5 per cent of the account receivable and a part of this expropriation was used for non-economic motives as well. Though the discriminated share reform has reduced this expropriation to some extent, the source of problem, separation of cash flow right and control right due to pyramiding, still continue to exist. Private owned listed firms showed an opposite results to the state owned listed firms. They are not able to invest sufficiently. There still asymmetry among the state and private owned firm in the stock market of China. In China, the state still retains control over listed companies; they have direct controlling power over economic resources. The state is still the ultimate controlling owner of about 60 percent of listed companies. Under this "concentrated and state ownership", listed companies have been termed the "wallet of state owner enterprises or governments." Result in this paper supports such a critical view. Privatization of state ownership and resolution of pyramidal ownership structure that facilitate expropriation are important agenda for China.

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[8]Economic implication of result for private owned firms is presumably related with asymmetric institution for financing among the state owned firms and private owned firms. One possible explanation is separation of cash flow and control rights of private owned firm happened due to financial constraint of them, but not due to expropriating motives. In order to understand what happening to the private firm, we need to set up a more appropriate behavioral model considering their financing behavior.

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