

Developing Bond Markets for Sustainable Growth of East Asia

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Though corporate bond markets can play important roles for East Asia's sustainable growth, it is very difficult to build a well-functioning corporate bond market. One of the reasons for the difficulty is that the hurdles to be overcome are closely related each other, resulting in a chicken or egg problem. This paper shows that the chicken or egg problem may come from externalities in corporate bond markets and analyzes the interaction of the externalities: dynamic externality and static network externality. Some policy implications are drawn from the results.

Keywords: Corporate bond markets, Chicken or egg problem, Interaction of externalities, Dynamic externality, Static network externality

JEL Classification: G18, L10

I. Introduction

In most developing East Asian countries, bond markets are small relative to banking systems. Especially, corporate bond markets are quite small. As written in many theoretical articles, if bank lending can proxy for all debt, we need not worry about the lagging corporate bond markets. However, the relationship banking system, which is dominant in several East Asian countries, can cause or exacerbate soft budget constraint problems or hold-up problems.

Soft budget constraint problems (or ever-greening) arise when a

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bank cannot deny additional credit when a borrower gets in trouble. A borrower on the verge of defaulting may approach the bank for more credit to forestall default. A bank that has already loaned money may well decide to extend further credit in the hope of recovering its previous loan, while the bank would not if it has no previous relationship with the borrower. Borrowers who realize that they can renegotiate their contracts *ex post* might have perverse incentives *ex ante*.

Hold-up problems arise when the proprietary information obtained by banks about borrowers give the banks an information monopoly. Since the bank can threaten the borrower firm not to extend credit, the borrower faces a liquidity risk. Banks could charge high loan interest rates as a result.

Broad, deep and resilient corporate bond markets have also become increasingly important from the perspectives of policy makers. Many of them contend the absence of bond markets leaves Asian economies more vulnerable to financial crisis. As Alan Greenspan pointed out, the bank-dominated Asian economies need a "spare tire."¹

A well-functioning corporate bond market can give various benefits to the economy.² Without it, firms may face a higher cost of funds and bias their investment policies toward short-term assets and away from entrepreneurial ventures. In addition, a well-functioning bond market provides an investment option to savers. Finally, efficient bond markets provide a significant source of information through market-derived interest rates. This information is lost without a well-functioning bond market.

In brief, corporate bond markets play important roles for East Asia's sustainable growth. However, building a well-functioning bond-market is very difficult, empirically. The next section offers an overview of East Asia's corporate bond markets. Section III discusses the difficulties in establishing well-functioning corporate bond markets and suggests a simple explanatory model. Section IV concludes with some policy implications.

¹..... The failure to have alternative forms of intermediation was of little consequence so long as the primary means worked. That is, the lack of a spare tire is of no concern if you do not get a flat. East Asia had no spare tires (Greenspan 2000).

² For a detailed explanation on the benefits of a corporate bond market, see Herring and Chatusripitak (2000).

TABLE 1
 SIZE OF BOND MARKETS (DOMESTIC BONDS OUTSTANDING)

	1997		2004	
	US\$ billions	% of GDP	US\$ billions	% of GDP
China	116.4	12.9	483.3	24.9
Hong Kong	45.8	25.9	76.8	46.3
Indonesia	4.5	1.9	57.7	22.7
Japan	4,433.6	97.6	8,866.7	197.7
Korea	130.3	25.1	568.3	83.2
Malaysia	57.0	57.0	106.6	90.0
Philippines	18.5	22.3	25.0	28.8
Singapore	23.7	24.7	78.6	73.1
Thailand	10.7	7.1	66.5	41.1
Memo: United States	12,656.9	62.9	19,186.6	161.6

Sources: ADB Asian Bonds Online and World Bank staff calculations, cited in Ghosh (2006).

II. Overview of Corporate Bond Markets in Asia³

Bond markets have grown rapidly over the past few years in East Asia as can be seen in Table 1. In most countries in the region, much of the initial impetus to growth did not come from corporate bonds but from government bonds issued primarily to restructure banking systems following the 1997 Asian financial crisis. From 1997 to 2004, government-issued bonds accounted for more than 50 percent of East Asia's regional bond market growth (excluding Hong Kong, China, and Korea). The corporate bond market⁴ remains quite small as a proportion of total bonds outstanding in most countries (Table 2). Moreover, according to Ghosh (2006), the proportion of quasi-government issuance is big in the East Asian corporate bond markets. Since quasi-government issuers are likely to borrow with government guarantees against default, they are likely to obtain the highest-quality credit available domestically.

³The explanation in this section mainly depends on Ghosh (2006) and Gyntelberg and Remolona (2005).

⁴In this paper, corporate bonds refer to all non-government long-term debt issues in a given currency. They include quasi-government issuers, financial and non-financial issuers and both resident and non-resident issuers.

TABLE 2
BREAKDOWN BY TYPE OF BOND ISSUER

	1997 (% of GDP)			2004 (% of GDP)			Contribution to growth 1997-2004 (%)		
	Government	Corporate	Financial Institutions	Government	Corporate	Financial Institutions	Government	Corporate	Financial Institutions
China	7.5	0.7	4.7	14.8	0.6	9.5	60.7	-0.3	39.3
Hong Kong	7.4	18.5	0.0	9.5	36.8	0.0	10.3	89.7	0.0
Indonesia	0.4	0.8	0.7	20.1	1.5	1.1	94.6	3.1	2.3
Korea	4.9	10.3	10.0	25.2	23.3	34.9	34.9	22.3	42.8
Malaysia	19.4	20.8	16.8	38.2	38.0	13.9	56.7	52.0	-8.8
Philippines	22.3	0.1	0.0	28.7	0.1	0.0	100.3	-0.3	0.0
Singapore	13.6	11.2	0.0	14.2	32.4	0.0	56.6	43.4	0.0
Thailand	0.2	6.0	0.9	22.4	12.3	6.4	65.2	18.6	16.2

Sources: ADB, BIS, and country sources, cited in Ghosh (2006).

The secondary corporate bond markets in most East Asian countries are also said to lack liquidity, with relatively little trading activity. According to Gyntelberg and Remolona (2005), they have developed less than the primary markets. The following describes the recent developments in Asia's primary markets and the liquidity in secondary corporate bond markets.

A. Primary Markets

a) Market Size

At the end of 2004, Japan had the largest corporate bond market among eight East Asian countries. Its size is \$2 trillion, accounting for more than two thirds of the total (Table 3). The next largest markets were Korea with \$355 billion and China with \$196 billion. These two markets can still be considered relatively large in the sense that they exceed the \$100 billion threshold (estimated by McCauley and Remolona (2000) as the size required for a deep and liquid government bond market). Note that this threshold for corporate bond markets can be much higher, because corporate bond issues are more heterogeneous than government bonds and the issue sizes smaller.

However, with any other liquidity thresholds, the remaining corporate bond markets seem too small. The next largest market is Hong Kong with \$62 billion, followed by Malaysia with \$50 billion,

TABLE 3
 SIZE OF CORPORATE BOND MARKETS AND OTHER FUNDING CHANNELS
 (At the end of 2004)

	Corporate bonds		Other channels as a percentage of GDP		
	Amounts outstanding (USD billions)	As a percentage of GDP	Domestic credit	Stock market capitalization	Government bonds outstanding
China	195.9	10.6	154.4	33.4	18.0
Hong Kong	61.9	35.8	148.9	547.7	5.0
Indonesia	6.8	2.4	42.6	24.5	15.2
Japan	2,002.0	41.7	146.9	76.9	117.2
Korea	355.6	49.3	104.2	74.7	23.7
Malaysia	49.7	38.8	113.9	140.8	36.1
Philippines	0.2	0.2	49.8	37.5	21.8
Singapore	21.7	18.6	70.1	211.4	27.6
Thailand	31.9	18.3	84.9	67.1	18.5
Memo: United States	15,116.6	128.8	89.0	138.4	42.5

Note: Defined as bonds and notes issued in the country's currency by either residents or non-residents, in both domestic and international markets.

Sources: IMF; World Federation of Exchanges; Dealogic Bondware; national data; BIS, cited in Gyntelberg and Remolona (2005).

then Thailand with \$32 billion, and Singapore with \$22 billion. Two other economies — Indonesia and the Philippines — have even smaller markets.

It is not surprising that the deepest corporate bond markets are those of the higher income economies — Hong Kong, Japan, Korea, and Malaysia. In each of these countries, as shown in Table 3, the size of the market exceeds 25% of GDP. It is also unsurprising that the shallow markets relative to GDP are those of the lower-income economies — China, Indonesia, and the Philippines. However, the size of the market would depend also on its level of development and the competition among financing alternatives on either the issuer or investor side.

b) Composition of Issuers

The types of issuers in a given market can be a good indication about how well developed the market is. For example, investors would find it worthwhile to evaluate large firms' credit quality based on publicly available information. The presence of non-resident

TABLE 4
LOCAL CURRENCY CORPORATE BONDS BY RESIDENCE OF ISSUER
(At the end of 2004)

	Residents (USD billions)	As a percentage of total	Non-residents (USD billions)	As a percentage of total
China	195.9	100.0	0.0	0.0
Hong Kong	27.3	44.1	34.6	55.9
Indonesia	6.8	99.8	0.0	0.2
Japan	1,646.1	82.2	355.9	17.8
Korea	355.2	99.9	0.4	0.1
Malaysia	49.5	99.6	0.2	0.4
Philippines	0.2	86.8	0.0	13.2
Singapore	13.9	64.0	7.8	36.0
Thailand	31.8	99.8	0.1	0.2
Memo: United States	13,535.9	89.5	1,580.7	10.5

Sources: Dealogic Bondware, BIS, cited in Gyntelberg and Remolona (2005).

issuers shows that the market is able to provide funds on terms that are competitive with those available in other currencies.

In many markets of East Asia, issuers seem to be concentrated near the high end of the credit quality spectrum. In Malaysia, about 40% of the market consists of issuers with the local ratings of triple-A and another 40% of issuers with double-A ratings. In Korea, about 80% are single-A or better.

As stated above, many corporate bond markets in East Asia have been driven by quasi-government issuance. Gyntelberg and Remolona (2005) suggest another indication of the importance of quasi-government issuers in Asian corporate bond markets. The composition of the HSBC Asian Local Bond Index (ALBI) is designed to track the performance of liquid local currency bonds in China, Hong Kong, India, Indonesia, Malaysia, the Philippines, Singapore, Taiwan (China), and Thailand. Though the index has a large number of constituent issues and includes non-government ones, these non-government constituent issues are restricted to quasi-government borrowers.

The presence of foreign issuers may also indicate how well developed a market is. It may reflect the efforts of policy makers in a small economy to find ways to develop their markets. As in Table 4, Hong Kong and Singapore Dollar markets have the highest proportions of non-resident issuers, with these issuers comprising

56% and 36% of the market, respectively.

B. Liquidity in Corporate Bond Markets in East Asia

Before considering the problems of liquidity in the Asian markets, it is worthwhile to note that even a large market such as the United States is not perfectly liquid. In contrast to stocks, corporate bonds are infrequently traded through dealers rather than exchanges. The lack of liquidity is due to a lack of trading activity in general, rather than any overall imbalance between buyers and sellers. The corporate bond dealer helps address this liquidity problem by holding an inventory of bonds. The dealer makes money by selling at a higher price than it bought. A dealer also provides liquidity by actively trying to find buyers and sellers for different bonds. Whereas bid-ask spreads in the inter-dealer market for US Treasury securities are less than 1 basis point, bid-ask spreads in the corporate bond market are about 3 to 5 basis points.

In the last few years government bond markets in East Asia have become reasonably liquid, while corporate bond markets remain relatively illiquid. Four factors are said to be keeping liquidity low in the Asian corporate bond markets: lack of diversity in the investor base, market opaqueness, inadequate market microstructures and a limited flow of timely information about issuers to creditors.

a) Diversity of Investor Base

In a market with a diverse investor base, it is less likely that different investors will find themselves on the same side of the market, either as sellers or buyers. Since the investors are more likely to disagree on the credit quality of an issuer or the price of the bond, they are more willing to trade. In addition, they are less likely to need liquidity at the same time. Most East Asian corporate bond markets lack such diversity. Their investor bases tends to be dominated by government-controlled provident funds, insurance companies and banks. Once a bond is issued, it normally disappears into the portfolios of buy-and-hold investors, and those who might trade more actively, such as fixed income funds and hedge funds, are typically missing from these markets. Most of institutional investors in these markets have internal guidelines that limit them to investing only in highly rated securities.

Another important class of investors missing from East Asian

markets is the foreign investor class, including global financial companies. In general, various market impediments discourage them from participating in these markets. Among these impediments are withholding taxes and the lack of repurchase markets.

b) Market Opaqueness

A second factor affecting liquidity is trading transparency, which is limited in many East Asian corporate bond markets. Transparency encourages competitive pricing and makes investors confident they are getting good prices. The experiences of the US tell us about the importance of market transparency in the development of corporate bond markets.

Recently, some Asian markets have started to enact reporting requirements similar to that of US Trade Reporting and Compliance Engine (TRACE). Much of this transparency, however, has been limited to dealers. In addition, the reporting requirements are not enforced in some cases. A good example is from the Korea Security Dealers Association (KSDA) which requires its member dealers to report their transactions within 15 minutes *via* its information distribution system. Since the information disseminated *via* the system to the public can reveal their positions and strategies, most Korean corporate bond dealers are reluctant to open their transaction information.

c) Market Microstructures

Bonds tend to trade more actively on over-the-counter (OTC) markets than on exchanges and trading on OTC markets needs well-functioning dealers. Inter-dealer brokers are also needed to allow dealers to trade with each other anonymously. Such microstructures have often required government encouragement to establish. In many East Asian countries, as in the US, primary dealers and market-makers for government securities are appointed by the authorities and required to make markets for government securities. Compared to government bonds, corporate bonds are handicapped by the fact that issues tend to be heterogeneous and issue sizes tend to be smaller. Hence, they may require even more help from the authorities in setting up microstructures.

Some East Asian countries tried to foster corporate bond liquidity by listing bond issues on existing stock exchanges or even creating exchanges devoted to fixed-income securities. According to Gyntelberg

and Remolona (2005), however, trading so far remains concentrated in the OTC market. In Seoul, for instance, over 90% of the secondary trading in corporate bonds still takes place in the OTC market. In Thailand, the turnover ratio has been 30% in the OTC market and only 1% on the local exchange. In China, because of regulatory fragmentation, financial issues have been traded only on the local inter-bank OTC market, while non-financial names have been traded either on the two domestic stock exchanges or on the inter-bank OTC market.

The bid-ask spreads tend to be wide in several of the East Asian secondary markets for corporate bonds, because the markets are less competitive and thus discourage trading. In a number of markets, there tend to be one or two dealers for a single issue, often the lead underwriters. In addition, many dealers and brokers provide their quote sheets only to a limited and non-comparable subset of potential investors.

d) Flow of Information

The last but not the least important factor is the limited flow of timely information about issuers. In corporate bond markets, much liquidity can be generated by the activity of investors who disagree about fundamentals. Since such information-based trading provides spillover benefits to those who are in the market, trading tends to be active when there is a significant flow of information about the issuers' credit quality, *etc.*

Such information flows are often very limited in Asian markets. A large number of issues carry one form of government guarantee or another. In addition, some East Asian corporate bond markets are said to have a pattern in which financial reporting tends not to recognize losses in a timely way. One reason is the lack of incentives for timely reporting in the Asian context, where personal networks in business are so important. Although there are local credit rating agencies in most East Asian countries, many such rating agencies are quite new and need more time to develop a historical record on which to build a reputation. While a handful of foreign rating agencies such as Moody's and S&P are active in Asian markets, they often do not provide ratings across the full array of bond issuers in individual countries.

III. Externalities in Corporate Bond Markets

The previous section gave an overview of the corporate bond markets in East Asia. There are many problems to overcome. Experiences with building well-functioning corporate bond markets tell us that these problems are very difficult to resolve and they are related each other. For example, a broad and diverse investor base is essential for well-functioning corporate bond markets. However, investors are reluctant to invest their money into assets which are listed and traded on a malfunctioning market.

Similarly, corporate bond dealers need to increase their ability to evaluate the issuers' default risks and to price the corporate bonds. But the dealers are not willing to invest money to raise those abilities when only a few firms are expected to issue bonds. On the other hand, firms do not want to issue their bonds through the dealers with a poor ability of evaluating default risks, because the investors may require a premium on the corporate bonds as a compensation for the risks caused by the poor ability of the dealers.

The description above of the difficulties suggests the presence of a "chicken or egg" problem in the construction of well-functioning corporate bond markets. Dealers need many heterogeneous issuers to have an incentive to raise their ability to price the bonds correctly, but to convince firms to issue bonds, the dealers should be good at pricing bonds.

This "chicken or egg" problem arises because of externality of bond issuance. A firm's bond issuance can benefit other firms through enhancing the dealer's ability to evaluate corporate default risks. Furthermore, the externality has a dynamic property: a dealer with more bond pricing experience must be better at evaluating default risks and pricing corporate bonds.

There seems to be another kind of externality in corporate bond markets: network externality. Network externalities are said to exist when consumer utility in a certain market depends (usually, in a positive way) on consumption of the same good or service by other agents. Markets with network externalities have been widely analyzed, especially since the contributions by Katz and Shapiro (1985), Farrell and Saloner (1985), and others. With regard to corporate bond markets, we can imagine that investors prefer variety of bonds, and thus, the more kinds of corporate bonds are on the

market, the higher their values are.

When there are positive externalities, economic theory tells us that the government should interfere with the market in order to increase the positive externality. The focus of this paper is how to deal with the externality when there are two positive externalities in the market: one with dynamic property and the other with static property. Moreover, the interaction of these two kinds of externality will change the magnitude of government intervention.⁵ Now let us move on to a simple model to consider the government's best policy when there are two kinds of externality.

As in Tirole (2006), there is usually no organized market for a standard commodity named "2-year bond at 10% interest rate." However, the focus of this paper is about the externality in corporate bond markets and every corporate bond is assumed to be the same. Suppose there are N firms that need to raise funds in a corporate bond market. There are two periods, and so the firms can issue their bonds in the first or second period. Firms prefer raising funds in the first period, reflecting the opportunity costs. δ , which is greater than zero but less than one, is the time preference ratio. Every firm has a unit demand for funds which is not divisible.

As stated above, there are two kinds of externality. $f(\bullet)$ stands for the dynamic externality of market making. Suppose that N_1 firms issued bonds in the first period. Market makers learned a lot about how to price and how to evaluate firms' default risks, *etc.* in the first period. Their learning in the first period makes investors in the second period believe that the pricing is much better than in the first period. This effect will lower the interest rates of the corporate bonds issued in the second period, even though the corporate bonds are the same. Thus, $f'(\bullet)$ is assumed to be positive.

Suppose there is a second kind of network externality in the corporate bond market. From the perspectives of investors, a variety of corporate bonds means a variety of assets. Of course, the investors prefer more variety. This kind of externality is not dynamic. The higher the number of corporate bonds in the first period, the higher their values are in that period, with no effect on prices in the

⁵These two externalities are somewhat different from two-sided externalities as in credit card industries because buyers are not included explicitly in the model. Evans (2002) argues that there are two-sided externalities in corporate bond markets. Roson (2005) reports that chicken or egg problems can rise as a result of two-sided externalities.

second period. $g(\bullet)$ represents the externality from variety, with $g'(\bullet) > 0$. To make the analysis simpler and more interesting, we add one more assumption: $f''(\bullet) < 0$ and $g''(\bullet) < 0$. This is necessary to get interior solutions.

The assumptions up to now can be summarized as the following equations for the price of corporate bonds. The effects on the price of the firm's default risk are normalized to zero. Since every firm is assumed to be the same, this normalization is reasonable. S_i is the subsidy from the government in period i . If S_i is negative, it can be interpreted as a tax. Firms will choose the period for their bond issuance after comparing the two prices.

$$\begin{aligned} P_1 &= f(0) + g(N_1) + S_1 \\ \delta P_2 &= \delta f(N_1) + \delta g(N_2) + \delta S_2 \end{aligned}$$

Before considering the social planner's problem, we consider the equilibrium. As a starting point, suppose there is only one kind of network externality, $f(\bullet)$, and there is no subsidy from the government. In addition, suppose δ equals one. In this situation, firms are reluctant to issue bonds in the first period. Rather, they want to have a free-ride on the firms who issue their bonds in the first period. As a result, there are two equilibria.

- (A) All firms issue their bonds in the second period.
- (B) One firm issues its bonds in the first period, and the other firms in the second period.

The above equilibria show the difficulties in forming well-functioning corporate bond markets in East Asia. Note that Case (B) is an equilibrium, because every firm does not have any profitable deviation. The firm issuing bonds at $f(0)$ in the first period does not have profitable deviation because if it goes to the second period, the price will be the same $f(0)$. Of course, the $N-1$ firms benefit from the firm who issues its bond in the first period. Their bond's price is $f(1)$. If the firm in the first period issues its bond in the second period, then every bond's price will be $f(0)$.

However, with the introduction of another kind of externality, $g(\bullet)$, Case (B) cannot be an equilibrium, if $g(\bullet)$ is not too big.⁶ Therefore,

⁶For example, $f(x) > g(x+1)$ for $x \in (0, N)$ is necessary to remove Case (B)

the unique equilibrium is that all firms issue their bonds in the second period. If a firm issues its bond in the first period, the price would be $f(0)+g(1)$. Thus, the firm has a profitable deviation of issuing its bond in the second period at $f(0)+g(N)$. The two externalities combine to concentrate firms' bond issuance in the second period.

δ does not change the above result. If $\delta < 1$ and $g(\bullet)=0$, there might be a few firms who want to issue their bonds in the first period. Suppose the number of the firms is a , which is a small number larger than 1. Then, $f(0) \leq \delta f(a)$ and $f(0) \geq \delta f(a-1)$. On the other hand, if $g(\bullet) > 0$ with the same level of δ , fewer firms will want to issue their bonds in the first period. This is because b , the number of firms issuing bonds in the first period with positive $g(\bullet)$, should satisfy the following inequalities $f(0)+g(b+1) \leq \delta[f(b)+g(N-b)]$ and $f(0)+g(b) \geq \delta[f(b-1)+g(N-b+1)]$. Comparing these two inequalities and the above two in the case of no static network externality tells us that a is greater than b when δ is close to 1.⁷ With positive $g(\bullet)$, fewer firms will choose to issue their bonds in the first period. Externality $g(\bullet)$ precipitates concentration of bond issuance together with externality $f(\bullet)$.

Now consider the problem of the social planner, the government. Suppose the government wants to make a well-functioning corporate bond market. In the well-functioning market, the interest rates posed on corporate bonds will be minimal and the bond prices will be the highest. Maximizing the sum of the bond prices is the same as maximizing the sum of positive externalities. In the framework of this paper, a good market is a market with the highest level of externality. The government uses S_1 and S_2 as ways to achieve the policy goal.

In order for the government to achieve its policy goal with the lowest budget, it is clear that S_2 should be less than or equal to

from the set of equilibria.

⁷This argument can be put in a much simpler way as the following. Suppose N is very big and we can treat a and b as real numbers. Then, the equilibrium condition of the case without static network externality is $f(0) = \delta f(a)$. On the other hand, with static network externality, the equilibrium condition boils down to $f(0)+g(b) = \delta[f(b)+g(N-b)]$. Insert a into b 's place in both sides of this equation. Since $f(0) = \delta f(a)$, we have only to compare $g(a) = \delta g(N-a)$. Since δ is close to 1 and thus a is not a big number, $\delta g(N-a)$ is very likely to be greater than $g(a)$.

zero. Bond issuers in the first period should be subsidized to have an incentive to give positive externality to the bond issuers in the second period. Suppose that S_2 cannot be negative, that is, the government cannot tax the bond issuers in the second period. Then, the government's problem is choosing S_1 in order to maximize the positive externality. Let us find the optimal N_1 , maximizing the positive externality first. The government wants to maximize $N_1[f(0)+g(N_1)]+(N-N_1)[\delta f(N_1)+\delta g(N-N_1)]$. The optimal level of N_1 is the following:

$$N_1^* \equiv \operatorname{argmax}_{N_1 \in \{0,1,\dots,N\}} N_1[f(0)+g(N_1)]+\delta(N-N_1)[f(N_1)+g(N-N_1)].$$

The optimal level of N_1 depends on the value of δ and the specific functional forms for $f(\cdot)$ and $g(\cdot)$. However, it is clear that the optimal N_1 is neither zero nor N . The government's objective function is a kind of weighted sum of $f(\cdot)$ and $g(\cdot)$. If N_1 is zero, the dynamic externality will be also zero. Though the government has a maximum level of $g(\cdot)$, it is not the maximum of the weighted sum because of the assumptions of $g''(\cdot) < 0$ and $f''(\cdot) < 0$. If N_1 is N , there is no firm which can enjoy the dynamic externality. The optimal level of N_1 will be determined by considering the benefits and costs of additional bond issuers in the first period. If N_1 increases by one unit, the bond issuers in the first period will be pleased by the increased variety externality and the bond issuers in the second period will also be better off because of the increased dynamic externality. However, the number of firms which enjoy the positive dynamic externality will decrease and the variety externality in the second period will also decrease.

Suppose the optimal level of N_1 is N_1^* and the level of S_1 to achieve N_1^* is S_1^* . The equilibrium conditions are the following two inequalities:

$$\begin{aligned} f(0)+g(N_1^*+1)+S_1^* &\leq \delta[f(N_1^*)+g(N-N_1^*)] \text{ and} \\ f(0)+g(N_1^*)+S_1^* &\geq \delta[f(N_1^*-1)+g(N-N_1^*+1)]. \end{aligned}$$

Note that $P_1^* = f(0)+g(N_1^*)+S_1^*$ is smaller than $\delta P_2^* = \delta f(N_1^*)+\delta g(N-N_1^*)$ in the equilibrium. If $P_1^* \geq \delta P_2^*$, then a bond issuer in the second period has the profitable deviation of going to the first period to issue its bond, because $P_1^* = f(0)+g(N_1^*+1)+S_1^*$ is greater than $P_1^* = f(0)+g(N_1^*)+S_1^*$. On the other hand, in order for $(P_1^*, \delta P_2^*)$ to be

the equilibrium price, every firm issuing bonds in the first period must not have any profitable deviation, that is, $P_1^* > \delta P_2^* = \delta f(N_1^* - 1) + \delta g(N - N_1^* + 1)$. Although it is possible for N_1^* not to be supported as an equilibrium in certain circumstances, we will continue the analysis assuming that the functional forms for $f(\cdot)$ and $g(\cdot)$ can support S_1^* as the equilibrium price.

Now consider the interaction between the two kinds of externality when the government wants to set the optimal S_1^* . Rearranging the above conditions produce the following inequalities:

$$\begin{aligned} [\delta f(N_1^* - 1) - f(0)] + [\delta g(N - N_1^* + 1) - g(N_1^*)] \leq S_1^* \leq \\ [\delta f(N_1^*) - f(0)] + [\delta g(N - N_1^*) - g(N_1^* + 1)] \end{aligned}$$

The parts $\delta g(N - N_1^* + 1) - g(N_1^*)$ or $\delta g(N - N_1^*) - g(N_1^* + 1)$ tell us about the interaction of the two externalities. The existence of variety externality can help or hinder the government's job of making a well-functioning bond market. If N_1^* is relatively large and δ is not close to one, then the existence of variety externality helps the government. On the contrary, if N_1^* is relatively small or δ is close to one, the government has a tougher job of making well-functioning bond markets.

IV. Conclusion

To have well-functioning corporate bond markets is important for the sustainable growth of East Asia. Government interventions for building up markets can be rationalized because building up markets does not occur in markets. We can find many policy recommendations: rationalizing tax treatment; broadening the institutional investor base; improving corporate governance; strengthening the regulatory framework; promoting bond market centers, *etc.*

This paper focused on the interaction of the externalities in the corporate bond markets. According to the analysis, the government should consider the interaction before deciding on its subsidy to the market participants. The analysis also tells us that historical studies about the development of advanced corporate bond markets as in the US are important in the sense that those externalities are not unique to the East Asian markets.

The model in the paper has many shortcomings. The model is too

simple to make concrete analysis and policy recommendations. In addition, the investors are not explicitly modeled. Before including the investors as a building block of the model, however, the question of whether or not corporate bond markets are two-sided should be addressed.

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Comments and Discussion

*Comments by Sung Wook Joh **

This paper deals with a very important issue, corporate bond markets. While it is generally agreed that East Asian economies need to develop bond markets, doing so has been difficult. This paper theoretically explains why developing a bond market is difficult. This paper consists of two major parts; a review of current bond markets in East Asia and a theoretical model explaining the difficulties of bond markets with two types of externality. Also the author discusses the role of government subsidies in developing a working bond market. The paper provides good insights to understand important factors, and conditions needed to develop bond markets.

Let's start with the need to develop a well functioning bond market. The author emphasize the need for an economy to have a "spare tire" when banking sector is in trouble, as we experienced during the Asian crisis in the late 1990s. During the crisis period, many banks were in trouble and they could not extend or rollover their credits to borrowing firms and there was credit rationing. Borrowing firms have suffered when main bank is not "healthy." It is argued that borrowing firms need to have another source of raising capital in addition to the banking sector.

The author develops a theoretical model explain why firms do not issue bonds, explaining the difficulty of establishing a bond market. In his model, identical firms choose to issue corporate bonds when two types of externality exist: Dynamic externality: learning effect and static externality: network (variety) effect. Dynamic externality means that as financial intermediaries get more experienced over time, their valuation will become better and issuers will get higher valuation. Network externality means with a variety of choices, there will be more investors willing to purchase these bonds. Facing these two externalities, issuing firms (bonds issued) will be smaller than the socially optimal number of firms. The author shows that

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government can choose a subsidy level for bond issuers to reduce the problems associated with these externalities. However, he shows that a subsidy does not necessarily yield the socially optimal number of issuing firms.

The model suggests that despite a government subsidy it will be difficult to lure firms to issue corporate bonds in an early stage of bond markets. It also implies that developing a well working bond market is a daunting task. The model would be more convincing if it incorporates the fact that firms in reality consider the issuing cost and price of bonds compared to the costs of borrowing from banks. In addition, it may be necessary to introduce differences in issuing firms as the variety effects imply that investors value firm differences. Finally, but most importantly, I have to point out that externalities mentioned in the paper are not unique to East Asian Markets. Other developed countries still face or have faced the problems resulting from these externalities. The paper should have discussed the mechanisms, and policies that other countries have used to overcome these problems.

The need for a bond market in East Asian countries seem to be somewhat different from that in developed countries. Consider why we need banks from the beginning. In a perfect, complete market, the need to financial intermediaries is minimal. In imperfect and incomplete market, banks can lower transaction costs compared to individual investors, and costs related to asymmetry information. When there is information asymmetry between borrower and the rest, monitoring and screening activities by banks become important. With a repeated relationship with their borrowing firms, banks can reduce the costs associated with asymmetry information. This brings the importance of relationship banking.

Relationship banking however may have some problems such as soft budget constraints problems, looting problems and information monopoly (hold-up problems). Soft budget constraint problems which are also called ever-greening problems arise when banks cannot credibly deny credit to borrowing firms in trouble. A borrower on the verge of defaulting may approach the bank for more credit to forestall default. While a new lender would not lend to this borrower, a bank that has already loaned money may well decide to extend further credit in the hope of recovering its previous loan. Borrowers who realize that they can renegotiate their contracts *ex post* like this may have perverse incentives *ex ante* (Bolton and Scharfstein 1996).

If renegotiation of a loan agreement is too easy, a borrower may exert insufficient effort in preventing a bad outcome from happening. Granting seniority to the bank may provide amelioration.

Looting problems (La Porta *et al.* 2003) occur when borrowing firms take advantage of their relationships with creditor banks for their own benefits. Using the Mexican banks and borrowing firms, LLZ have documented that borrowing firms related with creditor banks have borrowed at a lower cost, pledged lower collateral, but they defaulted more than firms without relationship. Banks' recovery rate from the defaulted borrower with relationship was lower.

Information monopoly or hold up problems occur when the proprietary information about borrowers that banks obtain as part of their relationships may give them an information monopoly. Banks try to take advantage of the borrowing firms using their information, yielding rent extraction (rent sharing). Suppose banks know that the borrowing firms have a good project. Since the bank can threaten not to extend the loan to the borrowing firm, it faces a "liquidity risk" that profitable projects can be liquidated. Banks could charge (*ex post*) high loan interest rates (Sharpe 1990; Rajan 1992). The threat of being "locked in," or informationally captured by the bank, may make the borrower reluctant to borrow from the bank. Potentially valuable investment opportunities may then be lost.

There are several solutions to hold-up problems. Firms may opt for multiple bank relationships, but incur a cost. Ongena and Smith (2000) show that multiple bank relationships indeed reduce the hold-up problem, but worsen the availability of credit. Multiple relationships can reduce the value of information acquisition to any one individual bank (see Boot and Thakor 2000). Multiple relationships can cause too much competition *ex post*, which may discourage lending to "young" firms. Multiple creditors can complicate debt renegotiation. A long-term line of credit with a termination clause can be a potentially superior solution to the hold-up problem (Von Thadden 1995) In addition, Diamond (1991) and Rajan (1992) argue that public debt or arm's length debt can reduce the problem. Here issuing public debt means issuing corporate bonds. So a mix of public debt and private debt can reduce the problems.

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