The structure of production, financial liberalization, and financial stability in emerging markets*

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Abstract

This article studies financial stability in a model of an open and emerging market with two types of production technologies and the stochastic liquidity shocks to the household sector in the market. Foreign capital inflows, which are required for the tradable good industry, may result in a premature interruption of the production process if foreigners' liabilities are freely traded in a financial market. This result implies that in the long term, external liberalization in a well-developed financial market does not necessarily contribute to foreign capital induction and high economic growth due to internal and external factors.

Key words: foreign liabilities, financial liberalization, risk aversion.

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I. Introduction

One of the significant issues regarding economic stability in emerging markets is the interaction between production and finance. An emerging market typically realizes economic growth by induction of foreign capital inflow and promotion of export-oriented industries. Although foreign capital is essential for the emerging market, it is difficult to maintain a constant capital inflow. Therefore, the emerging market would explore the possibility of establishing a financial system to encourage foreign capital inflow and reduce the restrictions imposed on foreign investors. In other words, external financial liberalization is one of the solutions.

However, as suggested by Singh (1997), it is unclear whether external financial liberalization contributes to constant capital inflow and high economic growth in the long term. Fewer trading restrictions on foreign investors result in easier foreign capital movement, which may cause fluctuations in the capital inflow and outflow. In a large or closed economy, it appears that a credit crunch does not occur due to foreign capital movement. In contrast, since a small open economy does not possess sufficient capital, fluctuations in foreign capital movements affect it. Fluctuations in foreign capital may cause an untimely interruption in the production process and affect the economic growth.

Export-oriented industries that earn foreign currency require a long turnover time for production and cannot earn high profits in the short term. These industries complicate the problem of foreign liabilities for an emerging economy. If the output of the export-oriented industries is lower than that of other industries, such as non-tradable production industries, the economy grows in the absence of revenue from

foreign currency. Therefore, while the economy does not have the solvency of foreign liabilities in the early stages of the production process, it has the potential for economic growth. If the production process gets interrupted, the economy loses the opportunity for future growth and is also burdened with foreign liabilities. The industry structure should be carefully analyzed in cases where the economy has a capital inflow.

While both emerging and developed economies face the problems of industry structure and the solvency for foreign liabilities, the approach in this paper is valid for two reasons. First, export-oriented industries in emerging economies are immature compared to those in developed economies. This suggests that despite their growth potential, emerging economies do not have sufficient solvency for their foreign liabilities in the short term. Second, focusing on the impact of external financial liberalization is appropriate in the case of emerging markets because of their capital scarcity. If developed economies face liquidity shortage, they can utilize their alternate sources of capital. In contrast, when emerging markets face a liquidity problem, they have no option but to curtail their economic activities. Therefore, the impact of financial liberalization on emerging economies is critical.

This paper focuses on financial liberalization in the equity market of an emerging economy and examines its impact on the anticipated high growth in the long term. This is because the equity market acts as a major channel for foreign capital flows in an emerging economy. In order to focus on this issue, I present a model with two categories of foreign liabilities—long-term debt and equity—and examine the interaction between the domestic stock market and foreign capital. In order to compare these two types of foreign liabilities, this paper presents several propositions regarding the impact of financial liberalization on the financial stability and anticipated

growth of the emerging economy.

The relationship between foreign liabilities and financial stability has been analyzed by Chang and Velasco (2001) in the context of the Diamond-Dybvig banking system. Their model successfully clarifies the relationship between domestic and international liquidity. They proved that a panic in the domestic financial market may result in a sudden capital outflows depending on the maturity of the foreign liabilities. Chang and Velasco's framework provides a basis for understanding the role of foreign liabilities. In addition to Chang and Velasco's analysis, I present the case of a well-developed financial market as suggested by Jacklin (1987), which enables us to obtain a suitable solution to the problem of foreign capital induction.

Jacklin (1987) attempted to introduce non-intermediate finance in the Diamond-Dybvig model. His work proved that an equity market arrangement can achieve the same allocation as the Diamond-Dybvig's banking system without the possibility of a run. This suggests that an equity market has a self-stabilizing mechanism that eliminates volatility and instability of the financial system. I examine the performance of the equity market in a way proposed by Jacklin (1987) and demonstrated the model in which this self-stabilizing mechanism functions as well in a financial market with foreign capital inflows.

However, contrary to Jacklin's result, the self-stabilizing mechanism of the equity market does not necessarily contribute financial stability in an emerging economy with foreign capital inflows. External financial liberalization in the equity market encourages foreign capital inflows, but on the other hand, it permits early capital outflows at the same time. Untimely capital outflows cause a premature liquidation in the production process and deprive an emerging economy of the

opportunity for high economic growth. The impact of external financial liberalization involves a negative feature. This paper shows that this negative feature of financial liberalization actually emerges in an economy with foreign capital inflows.

The analysis presented in this paper borrows heavily from the literature on the continuous time scheme of the Diamond-Dybvig model by von Thadden (1997a). The model formulated by von Thadden re-examined the Diamond-Dybvig framework and demonstrated that the results obtained by Diamond and Dybvig (1983) are consistent with those of the continuous finite time model. The model constructed by von Thadden is useful in analyzing the mechanism of interaction between production and finance. This paper extends von Thadden's model (1997a) by taking into account foreign capital and diversification of production technologies. It is essential to distinguish between tradable and non-tradable good production technologies in order to analyze an emerging economy with foreign capital inflow because only the output of the tradable good production industries provides solvency for foreign liabilities.

This paper demonstrates that the term-structures of tradable and non-tradable good production industries play a crucial role in an emerging economy with foreign liabilities. Since only the tradable good production industries earn revenue from foreign currency, the solvency for foreign liabilities is affected by the intertemporal and the cross-sectional values of each industry.

In addition, this paper explains the internal and external factors that determine the effect of financial liberalization on financial stability and economic growth in the long term. The stability of a well-developed financial market depends on not only external factors such as the foreign capital movement or the world interest rate but also on internal factors such as the behavior of domestic investors. It is well known that

the volatility in a financial market is strongly affected by the risk-averse behavior of investors. This paper clarifies how internal factors influence the financial stability and the potential for future economic growth.

The outline of this paper is as follows. The basic framework is presented in section II. Section III examines the impact of financial liberalization and explores the internal and external factors responsible for this impact. Section IV presents a conclusion of the analysis.

II. The Basic Framework

Consider a small open economy populated by a continuum of ex-ante identical agents of total measure one. There exist two types of goods—tradable and non-tradable. The tradable goods are freely traded in the world market and can be consumed and invested globally. The price of a tradable good in the world market is fixed at one unit of foreign currency (one "dollar"). In contrast, non-tradable goods are neither exported nor imported; their consumption and investment is restricted to within the home country. The price of non-tradable goods is fixed at one unit of the home currency (one "bhat"). Therefore, dollars and bhats can be interchangeably referred to as the units of currency or consumption. From the viewpoint of the purchasing power parity, the exchange rate between a dollar and a bhat is fixed and normalized to one. Time is measured continuously, with $t \in [0, \ 1]$. Each agent is provided one unit of the non-tradable good at time t = 0 and lives until time t = 1.

At time t = 0, the agents are given access to two investment opportunities, which have constant returns to scale and increasing returns to time. One is an investment in

a tradable good production technology and the other is a non-tradable good production technology, respectively. The tradable and non-tradable good production technologies per unit investment are characterized by return functions π_1 and π_2, respectively, which lie in the interval [0, 1]. The tradable good production technology requires an initial investment of dollars and produces tradable goods, while the non-tradable good production technology requires an initial investment of either bhats or dollars or both at time t = 0 and produces non-tradable goods. Each of the functions π_i (i = 1, 2) is assumed to have the following properties: $\pi_i(0) = 1$, $\pi_i'(t) > 0$ for $t \in [0, \quad 1]$, and $\pi_i'(t)/\pi_i(t)$ is non-decreasing in [0, 1]. The first and the second assumptions are self-explanatory, while the third assumption suggests that the growth of the return should be non-decreasing in time. Based on the third assumption, such an economy can forfeit an incentive to interrupt a production process in order to reinvest in the same technology. In order to make the model more relevant to emerging economies, I shall impose additional assumptions. In this economy, the tradable good production technology is immature as compared to the non-tradable good production technology, with $\pi_2(t) > \pi_1(t)$ if and only if $t \in (0, \quad T_0]$. In order to avoid trivialities, I assume that $0 < T_0 < 1$. It is appropriate to assume that the tradable good production technology is illiquid as compared to the non-tradable good technology in an emerging economy. Typically, the production of tradable goods, such as steel and cars, requires a large fixed cost, and its output does not yield large returns over the short term. Since the emerging economy has not begun tradable good production, the technology yields lower returns in its early stages. Figure I shows the return curves for the two technologies for one unit of investment made at time t = 0. Investment and liquidation

are costless, and goods can be stored at zero cost.

There exists a world market where one dollar (or one unit of a tradable good) invested at any time t grows with the rate $\beta \geq 0$ at the marginal time point. The parameter β can be interpreted as the discount rate of foreign investors. Home agents can borrow a maximum of $\bar{\lambda}$ dollars from the world market but cannot invest in it. This asymmetry in market access is reinforced by the scarcity of capital in the home country or the "home bias" of the investment. I shall treat the credit ceiling as exogenous, which is also justified by several theories of international borrowing under sovereign risks.[1] As suggested by Chang and Velasco (2001), this can alternatively be considered as the result of domestic restrictions.

All home agents are considered to be identical at time t = 0. However, there is a liquidity shock on each home agent when the agent has to consume his/her entire wealth. This timing is not predictable on an individual basis and is observed in isolation for different agents at the time of consumption. The liquidity shock strikes the home agents as an exogenous stochastic event. It occurs in the period $t \in (0, \ 1]$ and is assumed to be i.i.d. with a cumulative density function F. Therefore, the date of consumption is a random event in the interval $0 < t \leq 1$, whereas for the population as a whole, the distribution of the liquidity shocks is non-stochastic with an empirical distribution function F. In order to avoid trivialities, the function F is assumed to be strictly increasing, $F'(t) > 0$, $F(0) = 0$ and $F(1) = 1$. Furthermore, the preference of a representative home agent over his/her lifetime is assumed solely on the basis of what he/she consumes at the timing of consumption. The representative home agent is indifferent to whether the goods consumed are tradable goods or non-tradable goods.

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[1] See Eaton and Gersovitz (1981), Eaton et al. (1986), and Aizeman (1989).

Since the time discount rate of the representative home agent is equal to zero, his/her expected utility at time t = 0 can be written a follows,

$$U = \int_0^1 u(c(t))dF(t),$$

where u(c) expresses the instantaneous utility function that satisfies u' > 0, u" <0, u'(0) = ∞, and u'(∞) = 0, and c(t) represents the consumption at time t. In this model, the instantaneous utility function is given by $u(c) = c^{1-\gamma}/(1-\gamma)$ with $\gamma > 0$. Assuming CRRA preferences simplifies the solution; however, this assumption is stronger than required to describe the model. In addition, home agents maximize the expected utility conditional on the information available to them and resource constraints.

As suggested by Diamond and Dybvig (1983), the uncertainty regarding the timing of consumption is the key to the home agents' investment strategy in this setup. The absence of aggregate uncertainty implies that home agents may gain by pooling their resources and acting collectively rather than in isolation. Therefore, it is assumed that they form a coalition called a "company." The objective of the company is to maximize the welfare of the representative home agent by selecting an investment-borrowing strategy and a consumption stream for each home agent depending on the date of consumption.

Let $V_i(t)$ denote the aggregate value of the asset available for technology i at time t and λ denote the aggregate borrowing of dollars by foreign investors. On the initial date, assume that $V_1(0) = I_1$ and $V_2(0) = I_2$ (I_i: the initial investment in technology i, $I_1 + I_2 = 1 + \lambda$). On the final date, the repayment for the foreign liabilities requires $V_1(1) = \lambda e^{\beta}$. Let $c_i(t)$ represent the aggregate rate of liquidation of the investment in technology i at time t. The evolution of $V_i(t)$ is determined by $c_i(t)$, and $V_i(t)$ would increase instantaneously with $\pi_i(t)$ in the absence of liquidation. Hence, the transition

of the aggregate value of the technology i at points of differentiability of F yields

$$V_i'(t) = \frac{\pi_i'(t)}{\pi_i(t)} V_i(t) - c_i(t) F'(t) . \tag{1}$$

The aggregate value of the asset in technology i can be obtained by a straightforward integration of equation (1) with the initial condition $V_i(0) = I_i$, i.e.,

$$V_i(t) = \pi_i(t) \left(I_i - \int_0^t \frac{c_i(\tau)}{\pi_i(\tau)} dF(\tau) \right). \tag{2}$$

The aggregate value of the asset in technology i at any time is given by its gross return minus what has been harvested from it. The first-best solution is to maximize the aggregate expected utility for the representative home agent subject to resource constraints. Mathematically,

$$\max_{c_1, c_2, I_1, I_2, \lambda} \quad \int_0^1 \frac{c(t)^{1-\gamma}}{1-\gamma} dF(t) , \tag{3}$$

subject to

$$c = c_1 + c_2 , \;\; c_1 \geq 0 , \;\; c_2 \geq 0 , \tag{4}$$

$$V_1(t) \geq 0 , \;\; V_2(t) \geq 0 , \qquad \forall t \in (0, \;\; 1], \tag{5}$$

$$0 \leq \lambda \leq \bar{\lambda} , \;\; 0 \leq I_1 \leq \lambda , \;\; 0 \leq I_2 \leq 1 + \lambda - I_1 , \;\; V_1(1) \geq \lambda e^{\beta} . \tag{6}$$

The first-order condition requires that the optimal allocation should satisfy the following relationship:

$$\left(\frac{c^*(t)}{c^*(1)} \right)^{-\gamma} = \frac{\pi_i(1)}{\pi_i(t)}, \qquad if \;\; c_i^*(t) \geq c_j^*(t), \qquad i \neq j, \;\; i, j = 1, 2. \tag{7}$$

If β is known, the optimal consumption path at time t = 0 for the representative home agent can be obtained by solving equations (3)–(6).

Remark:

The optimal consumption path for the representative home agent is determined by the following:

$$c_1^*(t) = \begin{cases} 0, & t \in [0,\ T_1], \\ \bar{c}_1 \cdot \pi_1(t)^{\frac{1}{\gamma}}, & t \in [T_1,\ 1], \end{cases}$$
$$c_2^*(t) = \begin{cases} \bar{c}_2 \cdot \pi_2(t)^{\frac{1}{\gamma}}, & t \in [0,\ T_1], \\ 0, & t \in [T_1,\ 1], \end{cases} \tag{8}$$

where the constants $\bar{c}_1$ and $\bar{c}_2$ are obtained by solving

$$\bar{c}_1 \int_{T_1}^{1} \pi_1(t)^{\frac{1}{\gamma}-1} dF(t) = I_1^* - \frac{\lambda^* e^{\beta}}{\pi_1(1)},$$
$$\bar{c}_2 \int_{0}^{T_1} \pi_2(t)^{\frac{1}{\gamma}-1} dF(t) = I_2^*. \tag{9}$$

The optimal I_1, I_2, and λ^* will be defined in equations (11) and (12). The switching time point T_1 ($0 < T_1 \leq 1$) is given by

$$T_1 = \max\left[T_0,\ \left(t \left| \bar{c}_1 \cdot \pi_1(t)^{\frac{1}{\gamma}} = \bar{c}_2 \cdot \pi_2(t)^{\frac{1}{\gamma}} \right. \right) \right]. \tag{10}$$

Therefore, the optimal portfolio of the initial investment yields

$$I_2^* = \max\left[1,\ \int_0^{T_1} \frac{c_2^*(t)}{\pi_2(t)} dF(t) \right],$$
$$I_1^* = 1 + \lambda^* - I_2^*. \tag{11}$$

The amount of foreign capital is determined by

$$\lambda^* = \begin{cases} \bar{\lambda}, & if \quad e^{\beta} < \pi_1(1), \\ 0, & if \quad e^{\beta} \geq \pi_1(1). \end{cases} \tag{12}$$

Proof of Remark: Refer Appendix.

The first-best solution is characterized by five distinct features. First, each

home agent can consume from the coalitional investment, which provides a superior return, at any time by forming a company. The optimal allocation is not available in the direct investment economy where each home agent harvests his/her investment using his/her endowment. This feature indicates the superiority of intermediate finance with regard to risk sharing by the home agents. Second, the optimal return path grows slower than the production if $\gamma > 1$ (figure II). This suggests that the consumers who receive liquidity shocks earlier receive greater returns compared to what the initial endowment and the foreign borrowing would have yielded, at the expense of consumers who did not receive the shocks in the early stages. From an ex-ante perspective, this ex-post redistribution among home agents is desirable.

Third, this company uses foreign capital if and only if the parameter β satisfies the condition $e^{\beta} < \pi_1(1)$. This implies that foreign capital inflow occurs when the interest rate in the world market is lower than the growth rate of the economy. This is self-explanatory and plausible to explain the behavior of international capital flow in the actual economy. Fourth, if the amount of foreign capital inflow is large, the foreign capital is invested not only in the tradable good production but also in the non-tradable good production. This feature is derived from the idea of the efficiency of the portfolio. Excess concentration of investment in tradable good production is not profitable for the representative home agent, and therefore, the company assigns an appropriate amount of capital to each technology to achieve an optimal allocation.[2]

The most significant feature is that the non-tradable production technology is liquidated before the tradable good production technology. This is because the output of the non-tradable good production remains lower than that of the tradable good

[2] Therefore, the switching time point T_1 lies between T_0 and 1.

production in the early stages of the economy. Since the tradable good production is presumably immature in the early stages of the emerging economy, it is efficient to first consume the non-tradable good, which yields higher returns in the early stages. This turns out to be a source of premature interruption of a production process, as will be described later.

In order to investigate whether the optimal allocation is implemented, the profit distribution policy of the company should be known. Each home agent receives one unit of stock of the company per unit of investment of his/her endowment at time t = 0. The company distributes dividends to the stockholders in bhats at any point in time. The ex-dividend stocks of the company can be traded in a share market. Subsequently, agents require currency exchange from the company if necessary. Let y(t) represent the dividend per unit of the stocks and p(t) represent the price of the ex-dividend stock. The share price p(t) depends on the dividend policy of the company and the market clearing condition.

There are two types of foreign liabilities considered in this paper. One is a long-term debt contract that allows creditors to claim repayment at time t = 1 and no request for premature refund is accepted. The other form is an equity finance, in which the company sells its stocks to foreign investors who have the right to receive dividends. In this case, there are no trading restrictions for foreign investors to sell/buy stocks. It is interesting to compare these two types of foreign liabilities in order to clarify the impact of external financial liberalization on the production and liquidation policies of the company. In the next section, I examine whether the optimal allocation is sustainable under the economy for each type of foreign liability.

III. Financial liberalization and financial stability

In this section, the impact of external financial liberalization on financial stability and the potential for long-term economic growth is analyzed. Since the economy under consideration requires foreign capital for the tradable good production, it is necessary to consider a financial system that allows the economy to attain both foreign capital inflow and financial stability. It is evident that financial liberalization leads to foreign capital inflow. However, it is unclear whether external financial liberalization contributes to financial stability. This paper answers this question and clarifies the interaction between production and financial structures by comparing the two types of foreign liabilities and examines whether the optimal allocation presented in section 2 is implemented in this economy with regard to each type of foreign liability. If the optimal allocation is not sustainable, premature liquidation may occur, which is neither optimal nor desirable. The objective of this section is to examine the possibility of this vulnerability and the impact of external financial liberalization on financial stability. The maturity of foreign liabilities and the term structure of production technologies will play a crucial role in the financial stability in an emerging market. The long-term debt contract is analyzed first, followed by an analysis of the freely-traded stock.

Suppose that all home agents invest their endowments in the company and the company borrows an optimal amount of dollars from the world market. The long-term debts are neither refunded until the maturity date $t = 1$ nor can be traded in a financial market. Therefore, the foreign investors have to retain their claims until $t = 1$. Consider the case where the company distributes dividend at the rate of

$y(t) = c^*(t)F'(t)$ for any t. In this case, the optimal allocation presented in section 2 is implemented and no premature liquidation appears in the economy.

Proposition 1.

The long-term debt contract achieves the optimal consumption allocation without the risk of financial turmoil.

Proof of Proposition 1. Denote $S_L(t)$ as the amount of stock owned by a home agent who has not been consumed till time t. Based on the assumption, a fraction F(t) of home agents have already received liquidity shocks. Suppose that all the company stock is held uniformly by the remaining consumers, i.e., by consumers who have not received the liquidity shocks. $S_L(t)$ should be expressed as

$$S_L(t) = \frac{1}{1-F(t)}. \tag{13}$$

Straightforward differentiation of equation (13) at point t yields the following expression:

$$S_L'(t) = \frac{F'(t)}{(1-F(t))^2}. \tag{14}$$

Since the remaining consumers are assumed to purchase the stock with the received dividend, the amount of stock owned by the remaining consumers would increase with y(t)/p(t). Therefore, the evolution of $S_L(t)$ can be expressed as follows:

$$S_L'(t) = \frac{y(t)}{p(t)} \cdot S_L(t). \tag{15}$$

I define the inference equilibrium price of the share $p_L(t)$ as the price that satisfies equations (13)-(15), i.e.,

$$p_L(t) = \frac{1-F(t)}{F'(t)} \cdot y(t) = c^*(t)(1-F(t)). \tag{16}$$

Since the home agents who receive the liquidity shock at precisely the time t have an infinite marginal rate of substitution between the current and future consumption, it is evident that they sell all their assets at any price $p(t) \geq 0$. On the other hand, the consumers who have not received the liquidity shocks have a zero time preference rate at time t. The remaining consumers who have not received the liquidity shock until time t will purchase the ex-dividend stocks at any price p(t) if the rate of return on equity is greater than zero. The inference equilibrium price $p_L(t) = c^*(t)\big(1 - F(t)\big)$ satisfies the condition

$$\frac{p_L'(t) + y(t)}{p_L(t)} = \frac{c^{*\prime}(t)}{c^*(t)} > 0 .$$

The supposition that the consumers who have not received the liquidity shocks will purchase the stocks by using the received dividend is satisfied in the equilibrium condition. In this case, the stock of the company is owned uniformly by the remaining consumers, and consequently, there is no violation of the supposition of equation (13).

In the equilibrium condition, all the remaining consumers purchase the stock and release their received dividend, and the home agents who have received the liquidity shock at time t can collect all the liquidation of the company in exchange for their ex-dividend stocks. Each home agent under a liquidity shock can consume $y(t)/F'(t) = c^*(t)$, which is the ex-ante optimal consumption level for home agents.

Q.E.D.

Proposition 1 implies that the optimal consumption allocation is implemented in an economy with a long-term contract of foreign liabilities without deviating from optimality. This indicates that trading restrictions on foreign investors do not cause a

financial distortion in such an economy. According to previous researches on the Diamond-Dybvig deposit system, trading restrictions on depositors (home agents in this paper) may cause bank runs or deviation from optimality, as opposed to the observation made in this paper. The implication of this difference between Proposition 1 and the previous researches will be provided at a later point in this section.

Financial liberalization in the stock market should now be considered for the following reason. Foreign investors are unwilling to commit their capital if the emerging market prohibits premature foreign capital outflows despite the market being risky. However, foreign capital inflows are required for the development of tradable good industry, which leads to higher economic growth. Such an emerging market has no choice but to abolish the restrictions on premature trading and capital outflows by foreign investors in order to promote foreign capital inflows.

To begin the discussion, recall the optimal consumption stream in the economy. A fraction $F'(t)$ of home agents receive $c^*(t)$, where $t \in (0, \ 1]$, and the foreign investors receive $\lambda^* e^{\beta}$ at the final date. This is equivalent to considering that there is a fraction $F'(1)$ of home agents plus $\lambda^* e^{\beta} / c^*(1)$ agents who demand $c^*(1)$ as the dividend at the final date. If the foreign investors acquire $c^*(1)$ when they own one unit of the stock at time t = 0, they will purchase the stock at a price $c^*(1)e^{-\beta}$ in terms of dollars at the initial date. In this case, the foreign investors purchase $\lambda^* / c^*(1)e^{-\beta}$ of the company's stock at a price $c^*(1)e^{-\beta}$, and therefore, the total capital inflow amounts to λ^*. Since the home agents receive one unit of the stock per bhat invested, the company issues $1 + \lambda^* / c^*(1)e^{-\beta}$ units of its stocks at time t = 0. Set the per-stock dividend y(t) to $y(t) = c^*(t)F'(t) / (1 + \lambda^* / c^*(1)e^{-\beta})$, where $0 < t \leq 1$ and the liquidation dividend at the final date to $c^*(1) \cdot \left(\lambda^* / c^*(1)e^{-\beta}\right) / \left(1 + \lambda^* / c^*(1)e^{-\beta}\right)$. In order to avoid

unnecessary details, it is assumed that there is no capital control levied on foreign investors at any time t. Therefore, the foreign investors are able to liquidate their asset at any time if they sell their stocks in the stock market. Recall that the long-term debt contract leads to the optimal allocation for home agents without the risk of financial vulnerability. However, without trading restrictions, the foreign liability may be subject to financial vulnerability in the following case.

Proposition 2.

If foreign creditors purchase the stocks instead of the long-term debts, there is a set of the parameters {β, γ}, which causes premature liquidation of the tradable production technology.

Proof of Proposition 2. Let $S_E(t)$ denote the amount of stock owned by a stockholder who owned one unit of the stock at the initial date and has not consumed until time t. Consider the case where the foreign investors decide to re-invest in the stock by using the received dividend and not consume until time t = 1. Based on this assumption, a fraction F(t) of home agents have already received the liquidity shocks, and there are $1+\lambda^*/c^*(1)e^{-\beta}$ units of the stock in circulation in the market. If and only if all the company stock is uniformly owned by the remaining stockholders, i.e., by the home agents who have not received the liquidity shocks and the foreign investors, $S_E(t)$ should be expressed as

$$S_E(t) = \frac{1+\lambda^*/c^*(1)e^{-\beta}}{1-F(t)+\lambda^*/c^*(1)e^{-\beta}}. \tag{17}$$

Differentiating (17) yields

$$S_E{}'(t) = \frac{(1+\lambda^*/c^*(1)e^{-\beta})F'(t)}{\left(1-F(t)+\lambda^*/c^*(1)e^{-\beta}\right)^2}. \tag{18}$$

The evolution of $S_E(t)$ would be determined by the amount of stock that can be purchased by using the received dividend. Therefore, $S_E(t)$ can be expressed as

$$S_E{}'(t) = \frac{y(t)}{p(t)} \cdot S_E(t). \tag{19}$$

I define the inherent price of the stock $p_E(t)$ as the stock price that satisfies equations (17)-(19), i.e.,

$$p_E(t) = \frac{y(t)\left(1-F(t)+\lambda^*/c^*(1)e^{-\beta}\right)}{F'(t)} = \frac{c^*(t)\left(1-F(t)+\lambda^*/c^*(1)e^{-\beta}\right)}{1+\lambda^*/c^*(1)e^{-\beta}}. \tag{20}$$

The inherent price is the price resulting from the market clearing when the home agents who receive the liquidity shock at that point in time sell their stocks and the remaining home agents and the foreign investors purchase them. The home agent who has not received the liquidity shock will purchase the ex-dividend stock at the inherent price $p_E(t)$ because his/her time preference rate is zero at this marginal time point and the rate of return of the stock becomes positive, i.e., $\frac{p_E{}'(t)+y(t)}{p_E(t)} = \frac{c^*{}'(t)}{c^*(t)} > 0$ for all $t \in (0,\ 1]$. However, the decision taken by the foreign investors may be different. It should be noted that the foreign investors have access to the world market. The world market offers an interest rate β at any marginal time point per unit of investment. Therefore, the foreign investors decide to sell/buy the stock based on a comparison between the expected return from the stock and that from the world market. The foreign investors purchase the shares if and only if

$$\frac{p_E{}'(t)+y(t)}{p_E(t)} > \beta. \tag{21}$$

If the inherent price satisfies the inequality (21), the foreign investors find it advantageous to reinvest in the stock. However, there is no guarantee that $p_E(t)$ would satisfy the inequality (21). When the rate of return on the stock is less than the interest rate in the world market, the foreign investors immediately sell the stocks owned by them and repatriate their capital to the world market instead of reinvesting in the stock. Although liquidation of the tradable good production is not expected until time T_1, premature liquidation of the tradable good industry occurs in the early stages of the economy because the foreign investors demand dollars to retrieve their assets.

Next, I will prove that there exists a set $\{\beta, \gamma\}$ at some time $t < T_1$ that violates the inequality (21). Since the optimal consumption path is determined by the growth rate of the production processes, the rate of return of the share can be expressed as follows:

$$\frac{p_E'(t) + y(t)}{p_E(t)} = \frac{c^{*'}(t)}{c^*(t)}$$
$$= \frac{1}{\gamma} \cdot \frac{\pi_2'(t)}{\pi_2(t)}, \qquad if \ \ 0 < t < T_1.$$

Therefore, premature liquidation occurs if

$$\frac{1}{\gamma} \cdot \frac{\pi_2'(t)}{\pi_2(t)} \le \beta . \tag{22}$$

It is sufficient to examine the case at time t = 0 in order to prove that a set $\{\beta, \gamma\}$ that satisfies the inequality (22) is not empty, when the growth of the production π_i is non-decreasing in time. Figure III shows the region representing the premature liquidation at time t = 0 along with the region representing foreign capital inflow.[3] Clearly, the set $\{\beta, \gamma\}$ that satisfies the inequality (22) is non-empty and strictly

[3] The set $\{\beta, \gamma\}$ that allows foreign capital inflow is presented in equation (12).

quasiconcave, which implies that premature liquidation of the tradable production technology takes place in the economy.

Q.E.D.

Contrary to Proposition 1, Proposition 2 implies that there are some cases where the economy cannot attain the optimal allocation despite the existence of a stock market. As shown in figure 2, the premature liquidation of the tradable good production occurs when the parameters β and/or γ are large. A large β can be interpreted as a high interest rate in the world market. It is obvious that a high interest rate in the world market would deprive an emerging market of the opportunity for economic growth, and a low interest rate in the world market would encourage capital flow into the emerging market.

In addition, a large γ causes the early repatriation of capital by the foreign investors. The parameter γ represents the relative risk aversion of the home agents. A large γ indicates that the home agents who received the liquidity shocks in the early stages receive more than what they can harvest from their initial endowment and borrowing. In this case, the optimal return stream has a flatter curve as compared to the original production stream, as illustrated in figure II. The more risk averse the home agents are, the smaller is the probability that economic growth will be realized. Therefore, there is no advantage for the foreign investors to reinvest to the stock. In order to achieve economic growth by the induction of foreign capital inflow and promotion of export-oriented industries, home agents should not overreact to unexpected liquidity shocks. In other words, when the home agents are risk averse, they cannot delay consumption until the production processes mature. Therefore, the

company liquidates the production processes to a larger extent in the early stages, and consequently, the foreign investors would withdraw their capital from the home country before the tradable good production technology develops. In contrast, the foreign investors find it advantageous to reinvest in the shares of the home country when the world market offers a low interest rate and/or the home agents are less risk averse.

It is debatable whether the problem of the premature liquidation actually occurs. If premature liquidation is anticipated in the economy, then under no circumstances would the company opt for equity finance instead of a long-term debt contract to acquire foreign capital. In the case where the premature liquidation is anticipated before the production begins, the economy may be unaffected by the problem. Yet, suppose that the interest rate in the world market suddenly increases after the initial date and the parameters β and γ unexpectedly satisfy the condition for the premature liquidation mentioned in the inequality (22). After the production processes has commenced, it is difficult to avoid the problem of premature liquidation because of the contract of foreign liabilities. In particular, the problem becomes critical in an economy with high risk aversion and foreign capital induction with the assumption of low interest rate in the world market. The economy will suffer premature liquidation and foreign capital outflow due to the unexpected rise in the world interest rate despite the potential for a high economic growth.

The results described in Proposition 1 and 2 indicate the following implication. In contrast to the trading restrictions imposed on home agents, which causes a financial distortion in the economy, trading restrictions on foreign investors eliminate the possibility of premature liquidation. Although the trading restrictions in the two cases differ in nature, these results suggest that market liberalization does not necessarily

contribute to financial stability in the economy. This is attributed to the nature of capital movements. The asset owned by the home agents remains in the home country even if it is liquidated. However, when an asset owned by foreign investors having access to the world market is liquidated, there is no guarantee that foreign capital would remain within the home country. In such a case, the amount of capital available to the company fluctuates with the foreign capital movement, which causes premature liquidation in the home country. The external financial liberalization may encourage foreign capital inflow but it simultaneously leads to financial vulnerability. Moreover, market liberalization for foreign investors may have a negative impact on the expected economic growth. This implies that it is preferable for an emerging market to raise foreign capital by long-term debt contract with trading restrictions and that external liberalization in a well-developed financial market does not always contribute to the induction of foreign capital and a high economic growth in the long term.

IV. Concluding remarks

I have presented a model demonstrating that the financial market liberalization for foreign capital does not necessarily contribute to long-term economic growth in an emerging market. There are “push” factors (the world interest rate) and “pull” factors (the risk aversion tendency of domestic stockholders) that determine the impact of financial liberalization on the expected economic growth. It is evident that low interest rate in the world market encourages foreign capital movement into an emerging market with a potential for development. On the other hand, it is noteworthy that the higher risk aversion of the market participants in the equity market causes the premature

liquidation of the production process and the early repatriation of capital by the foreign investors. When the risk aversion of the home agents is substantial, they overreact to unexpected liquidity shocks, and consequently, the aggregate rate of liquidation exceeds the growth of production in the early stages of the economy. In this case, the foreign investors do not expect a high growth in profit distribution, and therefore, the economy witnesses an early repatriation of capital by the foreign investors.

Previous researches suggest that trading restrictions on investors result in financial distortion, which is inconsistent with the result obtained in this paper. In the case of domestic liquidity, the trading restrictions are the reasons for financial distortion. However, in the case of foreign capital induction for economic growth, the trading restrictions ensure a constant capital supply. The conjecture that the external financial liberalization contributes to financial stability and high economic growth is not valid in emerging markets, and the long-term debt contract would be suitable for an emerging market that intends to achieve economic growth by the induction of foreign capital inflow and promotion of export-oriented industries.

Appendix: Proof of Remark.

Denote the objective in equation (3) by $\Phi(c) = \int_0^1 \frac{c(t)^{1-\gamma}}{1-\gamma} dF(t)$. For any $c \neq c^*$ that satisfies the constraints (4)-(6), the following should be calculated.

$$
\begin{aligned}
&\lim_{h\to 0}\frac{1}{h}\left[\Phi\left(c^{*}+h(c-c^{*})\right)-\Phi(c^{*})\right] \\
&\quad=\int_{0}^{T_1} c_2^{*}(t)^{-\gamma}\left(c(t)-c_2^{*}(t)\right)dF(t)+\int_{T_1}^{1} c_1^{*}(t)^{-\gamma}\left(c(t)-c_1^{*}(t)\right)dF(t) \\
&\quad=\int_{0}^{T_1}\frac{\bar{c}_2^{-\gamma}}{\pi_2(t)}\left(c(t)-c_2^{*}(t)\right)dF(t)+\int_{T_1}^{1}\frac{\bar{c}_1^{-\gamma}}{\pi_1(t)}\left(c(t)-c_1^{*}(t)\right)dF(t) \qquad \text{(A1)} \\
&\quad=\bar{c}_2^{-\gamma}\left(\int_{0}^{1}\frac{c_2(t)}{\pi_2(t)}dF(t)-1\right)+\bar{c}_1^{-\gamma}\left(\int_{0}^{1}\frac{c_1(t)}{\pi_1(t)}dF(t)-\lambda^{*}\left(1-\frac{e^{\beta}}{\pi_1(1)}\right)\right) \\
&\qquad+\int_{0}^{T_1}c_1(t)\left(\frac{\bar{c}_2^{-\gamma}}{\pi_2(t)}-\frac{\bar{c}_1^{-\gamma}}{\pi_1(t)}\right)dF(t)+\int_{T_1}^{1}c_2(t)\left(\frac{\bar{c}_1^{-\gamma}}{\pi_1(t)}-\frac{\bar{c}_2^{-\gamma}}{\pi_2(t)}\right)dF(t).
\end{aligned}
$$

The solution to equations (3)-(6) suggests that

$$
\begin{aligned}
&\bar{c}_1\cdot\pi_1(t)^{\frac{1}{\gamma}}<\bar{c}_2\cdot\pi_2(t)^{\frac{1}{\gamma}}, \qquad t\in\left(0,\quad T_1\right], \\
&\bar{c}_1\cdot\pi_1(t)^{\frac{1}{\gamma}}>\bar{c}_2\cdot\pi_2(t)^{\frac{1}{\gamma}}, \qquad t\in\left[T_1,\quad 1\right].
\end{aligned}
\qquad \text{(A2)}
$$

Therefore, (A1) can be written as follows:

$$
\begin{aligned}
&\lim_{h\to 0}\frac{1}{h}\left[\Phi\left(c^{*}+h(c-c^{*})\right)-\Phi(c^{*})\right] \\
&\qquad<\bar{c}_2^{-\gamma}\left(\int_{0}^{1}\frac{c_2(t)}{\pi_2(t)}dF(t)-1\right)+\bar{c}_1^{-\gamma}\left(\int_{0}^{1}\frac{c_1(t)}{\pi_1(t)}dF(t)-\lambda^{*}\left(1-\frac{e^{\beta}}{\pi_1(1)}\right)\right).
\end{aligned}
\qquad \text{(A3)}
$$

The constraints (4)-(6) require that

$$
\begin{aligned}
&\int_{0}^{1}\frac{c_1(t)}{\pi_1(t)}dF(t)\le\lambda^{*}\left(1-\frac{e^{\beta}}{\pi_1(1)}\right), \\
&\int_{0}^{T_1}\frac{c_2(t)}{\pi_2(t)}dF(t)\le 1.
\end{aligned}
\qquad \text{(A4)}
$$

The inequality (A4) implies that the left hand side of (A3) is negative. Since $\Phi(c)$ is strictly concave, for every $h\in(0,1)$,

$$
\begin{aligned}
&\Phi\left((1-h^{*})c^{*}+hc\right)>(1-h)\Phi(c^{*})+h\Phi(c) \\
&\qquad\Leftrightarrow\frac{1}{h}\left[\Phi\left(c^{*}+h(c-c^{*})\right)-\Phi(c^{*})\right]>\Phi(c)-\Phi(c^{*}).
\end{aligned}
\qquad \text{(A5)}
$$

Combining (A3)-(A5), I obtain $\Phi(c)<\Phi(c^{*})$. Consequently, c^{*} is the optimal consumption stream for the representative home agent in this economy.

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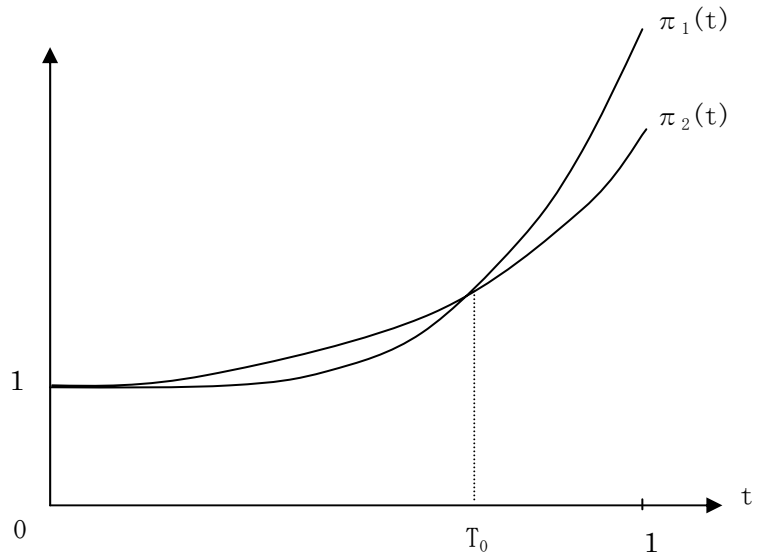

Figure I

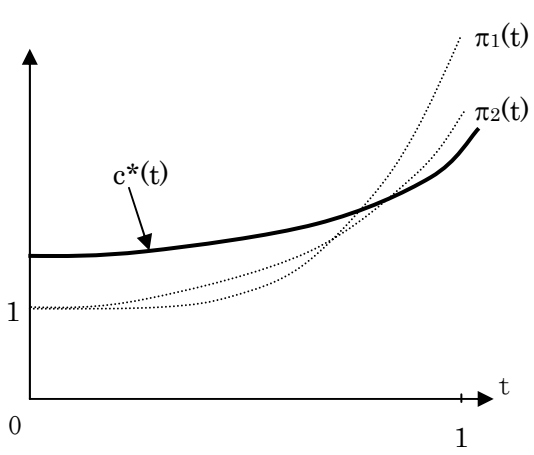

Figure II a: $\beta > 1$

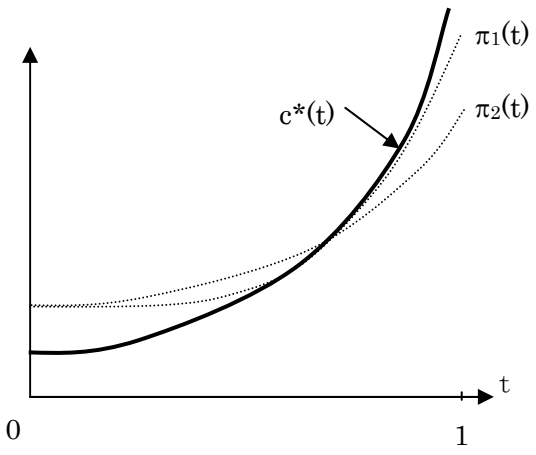

Figure II b: $\beta < 1$

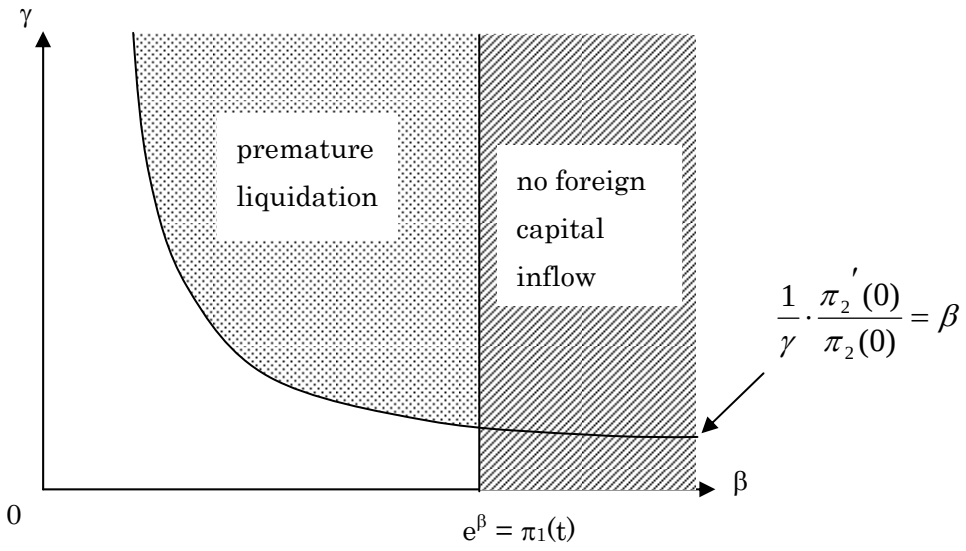
γ
premature
liquidation
no foreign
capital
inflow
$\frac{1}{\gamma}\cdot\frac{\pi_2'(0)}{\pi_2(0)}=\beta$
β
0
$e^{\beta}=\pi_1(t)$

Figure Ⅲ