2007

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Working Paper Series

Centre for Public Policy Studies
Institute of Humanities and Social Sciences

No. 181 (Mar 07) CPPS

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The Sequence of Economic Liberalization in a Developing Country with Incomplete Financial Market

Yue Ma*

Abstract

In this paper, an incomplete financial market model was built to illustrate the impacts of the market incompleteness on the benefits of trade liberalization. Particularly, it will focus on the investigation of the impacts of different sequences of opening up the goods market. That is, should the government open up international trade simultaneously with the opening up the domestic trade, i.e. implementing a "shock therapy" approach? Or should the government liberalize the domestic goods market first, then to deregulate the international trade, i.e. following a "gradualism" approach? This paper proves that the gradualism approach by opening domestic goods market before liberalization the international trade can guarantee the successive improvement of everyone's welfare. Therefore the gradualism approach is a Pareto improvement sequence.

Acknowledgements

An earlier draft of the paper was presented at the international conference on 'International Financial Markets and the Macroeconomy', Hong Kong Institute for Monetary Research, July 13-14, 2006, and the international conference on 'Financial bubbles, financial risks, and economic growth', Shangdong University, 22-23 April, 2006. The author is grateful for many useful comments and suggestions from Julan Du, Yin-Wong Cheung, Nelson Mark, Wensheng Peng, Jiankang Zhang, and other conference participants. The author also wishes to thank Koichiro Morikawa and Shihong Hong for providing the source of the Japanese regional data. This research was supported in part by a Competitive Earmarked Research Grant (No. LU3409/06H) from the RGC of Hong Kong SAR Government, and a research grant from Lingnan University, Hong Kong (No. DR06A3).

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1. Introduction

In the WTO agreement that the Chinese government signed at the end of 2001, the commitment is to open up the Chinese domestic market to foreign producers and to liberalize the international trade. This policy clearly is in the spirit of Ricardo's free trade theory based on comparative advantage. In reality, the comparative advantage is not easy to be defined and identified unambiguously. There are always uncertainties and risks. However, the risk can be fully insured in a complete financial market according to Arrow-Debreu's contingent market theory. Hence, trade is always better-off to everyone.

This argument becomes less strong, however, if one realizes that a developing economy such as China has a financial market that is far from complete. For example, the derivatives market in China is completely underdeveloped. The bond market is tiny. The foreign exchange market is restricted. Therefore, it is an urgent research topic to reconsider the main conclusions of economic theory based on the complete market assumptions for the developed economies when one makes policy recommendations for a developing country's government.

Here a good example of China is Professor Peng Shige from Shangdong University discovered some abnormalities in the international derivatives markets in the early 1990s that would generate substantial losses to the Chinese trading firms who were not aware of the problems. He wrote to the officials in charge and subsequently the trading was stopped and the potential losses were effectively avoided (Xu, 2005).

In this paper, I will build an incomplete financial market model to illustrate the impacts of the market incompleteness on the benefits of trade liberalization. Particularly, I will focus on the investigation of the impacts of different sequences of opening up the goods market. That is, should the government open up international trade simultaneously with the opening up the domestic trade, i.e. "shock therapy" approach? Or should the government liberalize the domestic goods market first, then deregulate the international trade, i.e. following a "gradualism" approach?

It is well-known that if the financial market is incomplete, there is no guarantee that more markets will generate Pareto-optimum outcome (Magill and Quinzii, 1996). In fact, Hart (1975) found an example that as

more markets opened, all consumers are effectively worse-off. Hence the sequence of market liberalization is path-dependent (Duffie and Rahi, 1995).

The main findings of this paper are that both international and domestic trade are better than no trade even in the incomplete market economy. However, if a government adopts the "shock therapy" approach to open up the international and domestic trade simultaneously, it faces a risk of welfare loss in comparison with the outcome of the gradualism liberalization approach. This paper proves that the gradualism approach by opening domestic goods market before liberalization the international trade can guarantee the successive improvement of everyone's welfare. That is, the gradualism approach is a Pareto improvement sequence.

The conclusion of this paper is also consistent with recent research findings on the Chinese gradualism reform approach. For example, Lau, et al (2000) found that the dual-track approach adopted by China in her transition process towards the full market economy is a Pareto improvement sequence. The gradualism approach was adopted in China to reform her agricultural sector first (Lin, 1992), and then to reform her industrial sector (Rawski, 1994). This is to win the political support of the majority of the rural population for further more difficult and controversial reforms in the urban area. As a result, the successful gradualism approach of pro-globalization and pro-entry into the global economy has reduced the number of poor in China by 150 million, which contributed significantly to the global poverty reduction (see, for example, Fischer, 2003). It has been well-recognized that this gradualism strategy has been implemented more effectively than the 'shock therapy' strategy adopted in eastern European economies (Parente and Rios-Rull, 2005; Lau, et al, 2000).

The main findings of this paper are also consistent with the empirical findings that emphasize on the importance of the sequence of trade liberalization for other developing countries (e.g., Krueger, 1997; Lee, 2004). For decades after World War II, Latin America's Southern Cone countries (Argentina, Chile and Uruguay) pursued inward-looking policies that relied heavily on government interventions. As a result, each economy suffered frequent balance of payments crises, hyper-inflation, and low economic growth. Starting from 1970s, these governments attempted to

switch from import-substitution industrialization strategy to a more neutral one by engaging in a sequence of liberalizing external sectors first, but domestic macroeconomic stabilization later. There were rapid financial market deregulation and reduction of trade barriers (Corbo and de Melo, 1985). This sequencing of reform led to a persistent real exchange rate appreciation, current account deficits, a large build-up of external debt, and eventual default in the debt crises in the 1980s (Corbo, de Melo, and Tybout, 1986; Edwards, 1989).

Nevertheless, international experiences of "shock therapy" approach also have successful examples. For instance, New Zealand endured a combination of high inflation and low economic growth in the 1970s. The policy response of the National Party was active interventionist to fix wages, prices, exchange rates, rents, interest and dividends. That led to an early election under the short notice in 1984 with 93.7% turnout, an indication of the desire by voters for a change of economic policy (Miller, 2005). The Labour Party under the leadership David Lange won a landslide victory in the election and quickly implemented a rapid programme of deregulation and public-sector restructuring (Evans, et al, 1996). It was argued that any delay of liberalization, as gradualism suggests, there would have been time for the opposing forces within the Labour Party to block the reforms or severely limit them (Lange, 1996). That is because these "shock therapy" reforms adopted monetarist approaches to control inflation, to sell state assets, and to remove tariffs and subsidies. They were strongly opposed by traditional Labour supporters. However, the implementation of these liberal reforms by a 'wrong' party perhaps was more credible as voters knew that the 'left-wing' Labour Party would pay more attention to the social welfare than the 'right-wing National Party (see Cukierman and Tommasi (1998) that provided a theory to explain this apparent incongruity). In the end, the Labour Party led by David Lange was re-elected for a second term in 1987. It is left for future research to embed the credibility of government policy in the simple model developed in this paper.

The remainder of the paper is organized as follows. Section 2 builds a simple two-period model with heterogeneous consumers and incomplete financial market. Section 3 provides the theoretical analysis of the model

solution. Section 4 conducts a Monte Carlo simulation. Finally, Section 5 concludes.

2. A heterogeneous consumer model with incomplete financial market

In my simple model, there are two countries. The domestic country has less developed economy with two types of consumers (i and j), two goods (1 and 2), and two states (v and w). Yet the financial market is incomplete with just one asset (see Ma (2007) for a full description of the model). As the focus is on the domestic economy, the foreign country is modeled as simple as possible. It is assumed that foreign country is a developed economy with just one type of consumer (f) who also consumes two goods. There are two periods in the model: the initial time period and the first time period. Consumers in both countries enjoy utility of consumption in the first period only. The utility of consumer k (=i, j and f) is given as follows:

$u^k(s) = \alpha_1^k \ln x_1^k(s) + (1-\alpha_1^k)\ln x_2^k(s)$,

where consumer k=i, j, f, and state s=v, w. α_1^k is the preference of consumer k for good 1 . $x_h^k(s)$ is consumer k's consumption of good h in state s.

The expected utility is given by:

$U^k = \alpha^k u^k(v) + (1-\alpha^k)u^k(w)$,

where α^k is the probability of state v that is believed to occur by consumer k, and the three consumers are disagreed on the this probability, i.e., $\alpha^i \neq \alpha^j \neq \alpha^f$. Therefore, it is a model with heterogeneous consumers. Consumer k's endowment vector is $(e_1^k(s), e_2^k(s))$ if state s occurs.

In the financial market, there is only one asset. One unit of the asset yields r(s) unit of monetary return in state s. Clearly this single asset cannot span the state space. Complete market should have 2x2=4 contingent markets in the Arrow-Debreu world, or 2 (assets) + 2 (spots) = 4 markets in a Rander equilibrium. With a single asset in my model, the financial market is therefore incomplete.

The budget constraint of consumer k in state s is therefore given as follows:

$\Omega^k(s) = p_1(s)\ e_1^k(s) + p_2(s)\ e_2^k(s)\ + r(s)\ q_A^k\ = p_1(s)\ x_1^k(s) + p_2(s)\ x_2^k(s)\ + p_A q_A^k$,

or,

$$\delta\Omega^k(s) = p_1(s)[\ e_1^k(s) - x_1^k(s)\ ] + p_2(s)[\ e_2^k(s) - x_2^k(s)\ ] + [r(s) - p_A]\ q_A^k = 0,$$

where $\Omega^k(s)$ is the total wealth of consumer k including the net gains from asset transaction, $p_h(s)$ is the spot price of good h in state s, $e_h^k(s)$ and $x_h^k(s)$ are endowment and consumption of good h for consumer k in state s, respectively, r(s) is the return of asset in state s, p_A is the price of asset, q_A^k is the quantity of asset held by consumer k. $q_A^k > 0$ indicates consumer k purchases q_A^k of asset; $q_A^k < 0$ means consumer k sells q_A^k of asset to the market.

In the following section, we will focus on the solution of sequential economy. In a sequential economy, consumers make a consumption plan based on the anticipated prices of consumption goods with rational expectations. They will share their risk partially through the incomplete financial market in the initial period. The spot markets then open at the subsequent time period. Consumers will fulfill their financial obligations at the financial market and will buy and sell consumption goods at the spot market. Therefore, the long-run equilibrium is achieved through a series of short-run transactions.

However, the sequential economy of trade liberalization can be taken place by two different strategies. One of the strategies is to open up the international trade immediately, a 'shock therapy' approach. Another one is to adopt a 'gradualism' approach by opening up the domestic trade first and then to open up the domestic market to international traders. In an incomplete market setting like my model presented here, we will show the consequences of these two strategies are quite different. That is, the outcome is path dependent.

3. Trade strategies in an incomplete financial market

3.1. 'Shock therapy' liberalization strategy

Under this strategy, the domestic government will open up the international trade immediately, starting from autarky position. Consumers in both countries will maximize their utilities subject to the budget constraint defined in the previous section.

Form the Lagrangian for consumer k's (k=i, j, f) optimization problem as

$L^k = \alpha^k u^k(v) + (1-\alpha^k)u^k(w) + \lambda^k(v)\,\delta\Omega^k(v) + \lambda^k(w)\,\delta\Omega^k(w)$

$=\alpha^k \alpha_1^k \ln x_1^k(v) + \alpha^k(1-\alpha_1^k)\ln x_2^k(v) + (1-\alpha^k)\alpha_1^k \ln x_1^k(w) + (1-\alpha^k)(1-\alpha_1^k)\ln x_2^k(w)$

$+\lambda^k(v)\{\, p_1(v)[\, e_1^k(v) - x_1^k(v)\,] + p_2(v)[\, e_2^k(v) - x_2^k(v)\,] + [r(v) - p_A]\, q_A^k \,\}$

$+\lambda^k(w)\{\, p_1(w)[\, e_1^k(w) - x_1^k(w)\,] + p_2(w)[\, e_2^k(w) - x_2^k(w)\,] + [r(w) - p_A]\, q_A^k \,\}$

The first-order necessary conditions for the consumption choices are then

$\partial L^k/\partial x_1^k(v) = 0 \Rightarrow x_1^k(v) = \alpha^k \alpha_1^k / [\lambda^k(v) p_1(v)]$,

$\partial L^k/\partial x_2^k(v) = 0 \Rightarrow x_2^k(v) = \alpha^k(1-\alpha_1^k) / [\lambda^k(v) p_2(v)]$,

$\partial L^k/\partial x_1^k(w) = 0 \Rightarrow x_1^k(w) = (1-\alpha^k)\alpha_1^k / [\lambda^k(w) p_1(w)]$,

$\partial L^k/\partial x_2^k(w) = 0 \Rightarrow x_2^k(w) = (1-\alpha^k)(1-\alpha_1^k) / [\lambda^k(w) p_2(w)]$,

Substituting $x_h^k(s)$ into the budget constraints, we can solve out $\lambda^k(s)$

$\lambda^k(v) = \alpha^k / [\, p_1(v)\, e_1^k(v) + p_2(v)\, e_2^k(v) + [r(v) - p_A]\, q_A^k \,]$,

$\lambda^k(w) = (1-\alpha^k) / [\, p_1(w)\, e_1^k(w) + p_2(w)\, e_2^k(w) + [r(w) - p_A]\, q_A^k \,]$,

There are three market equilibrium conditions for goods 1 and 2, as well as for the asset market. Setting the spot price of good 1 as numeraire, the equilibrium condition for goods market 2 is:

$$x_2^i(s) + x_2^j(s) + x_2^f(s) = e_2^i(s) + e_2^j(s) + e_2^f(s),$$

which solves for $p_2(s)$ as follows:

$p_2(s) = \{(1-\alpha_1^i)\, e_1^i(s) + (1-\alpha_1^j)\, e_1^j(s) + (1-\beta_1)\, e_1^f(s) + (\alpha_1^i\, q_A^i + \alpha_1^j\, q_A^j + \beta_1\, q_A^f)$

$[p_A - r(s)]\} / [\, \alpha_1^i\, e_1^i(s) + \alpha_1^j\, e_1^j(s) + \beta_1 e_1^f(s) \,]$

The first-order necessary conditions for the asset holdings are

$\partial L^k/\partial q_A^k = 0 \Rightarrow \lambda^k(v)[r(v) - p_A] + \lambda^k(w)[r(w) - p_A] = 0$,

The asset market equilibrium is

$$q_A^i + q_A^j + q_A^f = 0$$

Solving this nonlinear simultaneous equation system will obtain the equilibrium of the ‘shock therapy’ strategy.

Proposition 1. All consumers will not be worse-off after the international trade, comparing with the no-trade autarky.

This proposition is easily proven as all consumers have maximized their utility after trade, their utility levels are at least as high as that of endowments before trade.

3.2. Partial liberalization strategy of opening domestic trade only

Under this strategy, there is only trade between domestic consumers i and j. International trade is not permitted. The first-order conditions for

domestic consumers are the same as before, but the market equilibrium condition is changed to:

$$x_2^i(s) + x_2^j(s) = e_2^i(s) + e_2^j(s),$$

which solves for $p_2(s)$ as follows:

$$p_2(s) = \{(1-\alpha_1^i)e_1^i(s) + (1-\alpha_1^j)e_1^j(s) + (\alpha_1^i q_A^i + \alpha_1^j q_A^j)[p_A - r(s)]\} / [\alpha_1^i e_1^i(s) + \alpha_1^j e_1^j(s)]$$

The asset market equilibrium becomes

$$q_A^i + q_A^j = 0$$

Solving this new nonlinear system will obtain the equilibrium of the domestic trade.

Proposition 2. All consumers will not be worse-off after the international trade, comparing with the no-trade autarky.

This proposition is similar to Proposition 1, although the trade is restricted to domestic trade only. However, it is difficult to compare the benefits from international trade with the domestic trade theoretically. That is, international trade may not be a Pareto improvement over the domestic trade, and vice versa. This remains an important empirical question to be investigated later in Section 4.

3.3. Gradualism reform strategy to open up the international trade

This strategy will open the domestic market for domestic consumers as the first stage of liberalization process. The solution of this intermediate stage is obtained from subsection 3.2. The solution of the domestic trade effectively generates the new endowments for domestic consumers for their second-stage trade, which will be trade with both domestic consumers and foreign consumers. The solution of the second-stage international trade can be obtained from subsection 3.1, with initial endowments being replaced by the equilibrium from the first stage domestic trade. The final equilibrium therefore is obtained through a sequence of solving two nonlinear systems.

Proposition 3. Gradualism reform strategy is a Pareto improvement process for domestic consumers.

Proposition 2 provides the proof for the conclusion that the first stage domestic trade is a Pareto improvement for both domestic consumers. Based on the endowments from the domestic trade, the consumers continue to maximize their utilities from international trade. Therefore, both

domestic consumers will not be worse-off after the international trade, comparing with the domestic trade.

The key question now is which liberalization strategy, the shock therapy one or the gradualism one, generates more benefits for domestic consumers, and for foreigners. Given the complexity of the nonlinear system, there is no analytical solution available for the model to answer this question. A Monte Carlo simulation is therefore conducted in the next section with two real economies' structures as background.

4. Monte Carlo simulation

This section reports the results from a Monte Carlo simulation for the theoretical model built in the previous section. The economic background of the simulation is based on the empirical regional data from China (the domestic economy) and Japan (the foreign economy) in 2003. The regional disparity in the Chinese economy provided a natural complementarity for her domestic trade. Furthermore, it is well-known that China adopted the open door policy since 1978 and negotiated to have joined the WTO at the end of 2001. Therefore, it is interesting to investigate whether China should open up her domestic market first before further liberalizing her market for international trade. The foreign economy is chosen as Japan as the Japanese economy is one of the economies with lowest income inequality among the industrialized countries (Akita and Kataoka, 2003). It is therefore consistent with the simple assumption of the theoretical model.

The two types of consumption are chosen as goods and services, which are two most important consumptions of a modern economy. The latest regional data for Japan is 2003 and therefore Chinese data is chosen for 2003 accordingly. Therefore are 31 provinces, autonomous regions, and municipalities in mainland China. The mean, standard deviation, minimum, and maximum values of GDP per capita for goods and services across 31 regions in mainland China are presented in Table A. The data source is China Statistical Yearbook 2004, published by National Bureau of Statistics (2004). In Japan, there are 47 regional prefectures with various levels of GDP per capita for both goods and service. Table A also presents their mean, standard deviations, minimum, and maximum values. The data source is Annual Report on Prefectural Accounts 2005, published by

Government of Japan (2006). The geographical location of the regions of Japan and China are given by Fig 1 and 2, respectively.

Comparing the two economies in Table A, two interesting results can be observed. The first one is that Japanese income per capita is substantially higher than that of China. In fact, average regional GDP per capita is around 31 times of that in China. The second one is that Japanese regional disparity in terms of standard deviation is much lower than that in China. For Japan, the ratios of the highest to lowest GDP per capita for goods and services are 4.4 and 3.2 times, respectively, which are substantially lower than the corresponding ratios of 10.3 and 17.8 times in mainland China. Therefore, China has a long way to catch up both the level of income as well as the equality of income distribution of Japan.

For the Monte Carlo simulation, a model is constructed with a similar structure of the theoretical model built in the previous section. There are two (groups of) consumers (labeled as i and j) in domestic economy of China. There is one group of consumers in the foreign country Japan (denoted as f). Truncated normal distributions are assumed for the preferences of consumers, the expectations of the probability of the occurrence of the two states, v and w, the endowments of goods and services for all consumers, and the return of assets in the two states. The normality assumption is consistent with the law of large samples. The truncation is imposed for the preference and probability due to their (0, 1) bound. The truncations for the endowments are imposed by the minimum and maximum levels of GDP per capita in goods and services of the two countries. The only ad hoc assumption for the truncation of asset returns is to distinguish a ‘good’ return (below one yet still positive) and a ‘bad’ return (above one but less than 2). Similarly, endowments vary in these two states too.

Specifically, the preference of consumers for goods is assumed to be a standard normal distribution with truncation of [0.1, 0.9]. The asset return in a ‘good’ state (v) has a standard normal distribution with truncation of [1, 2]. Whilst a ‘bad’ state (w) will have the return with a standard normal distribution with truncation of [0.1, 0.9]. For the distribution of endowment, the simulated the sample has the truncation of empirical minimum and maximum values of regional GDP per capita for

goods and services respectively. Furthermore, the simulated the sample has been matched with the empirical mean and standard deviation as close as possible based on the following criteria:

$$SQE=(\mu_{simu} - \mu_{empirical})^2+(\sigma_{simu} - \sigma_{empirical})^2$$

where SQE is the sum of squared error, μ_{simu} and σ_{simu} are the mean and standard deviation of simulated sample, respectively, $\mu_{empirical}$ and $\sigma_{empirical}$ are the mean and standard deviation of the empirical data of regional GDP per capita.

In the Monte Carlo simulation, 1,000 independent pseudo-random numbers are generated for each of the variables. The statistics of the simulated sample are presented in Table 1. For each set of random variables of the preferences of consumers, the expectations of the probability of the occurrence of the two states, v and w, the endowments of goods and services for all consumers, and the return of assets in the two states, the utility derived from no trade (autarky) is calculated for each consumer and is presented in column (1) of Table 2. If the domestic market is liberalized directly to international trade following a so-called 'shock therapy' strategy, domestic consumers i and j are able to engage in domestic and international trades simultaneously. That is, they can trade with each other as domestic trade as well as trade with foreigner f in the international trade. The result is then obtained along the optimal solution from the theoretical model and is presented in column (2) of Table 2.

However, an alternative open door policy is to follow a 'gradualism' approach and to open up the domestic trade first before the international trade. The intermediate result of opening the domestic trade only is presented in column (3) of Table 2. The final outcome of liberalizing the domestic market to international trade, following the opening of domestic trade, is presented in the last column of Table 2. A quick look of the three different trade policies in column (2) to (4) against the outcome of autarky in column (1) indicates clearly that any trade is better than no trade. Any trade generates an upward shift of the mean, the minimum, and the maximum values of the utility of any individual consumer against their corresponding levels in autarky. This fact is confirmed Table 3, in which the differences between the utility of trade and autarky are calculated. The

mean and minimum values of the utility differentials are all positive in columns (1) to (3).

To test whether this upward shift of the utility is significant, a formal test is necessary to carry out. There are two issues we need to consider before choosing an appropriate test. The first issue is that consumers i and j in fact belong to one country. A comparison of welfare across different policies should treat them as a pair. That is, the significance of their gains from trade should be considered jointly for both of them, rather than being considered separately.

The second issue is whether the distribution of the upward shift in the utility is normal distribution. If this were the case, then a parametric test such as Hotelling's T^2 test (Hotelling, 1931), which is a multivariate version of the univariate t-test, can be applied. Unfortunately, the normality tests on the utility differentials of Table 4 based on skewness and kurtosis both failed at the 5% level for all individuals. As a result, a more sophisticated non-parametric version of the Hotelling's T^2 test described by Zwick (1985) is applied in this study. It is a rank multivariate analysis to test the significance of the positive gains in utility form trade. The rank test results are also reported in Table 3. Interestingly, it is found that both Chinese consumers i and j have significant benefit from any trade, according to the $\chi^2(2)$ tests. The Japanese consumer f nevertheless has no significant benefit, as shown by the $\chi^2(1)$ tests. This is probably due to the fact that the income level of Chinese consumers is substantially lower than their Japanese counterparts. The trade benefits therefore are significant for low income consumers.

Nevertheless, the conclusion that trade is better than no-trade perhaps is not surprising at all. It was discovered by David Ricardo (1817) nearly 200 years ago. It is also proven by the theoretical model in the incomplete financial market structure in the previous section. The important issue is to compare different sequences of liberalizing policies since the outcome is path-dependent in an incomplete financial market structure. This exercise is carried out in Table 4. Using the benchmark of the partial liberalization policy of opening the domestic trade, columns (1) and (2) in Table 4 indicate that this is inferior to both full liberalization policies of shock therapy strategy and gradualism reform for Chinese consumers. The

difference in utility of full liberalization and domestic trade is always positive. Furthermore, the non-parametric test indicates that the both full liberalization policies generate higher utilities that that of domestic trade for the Chinese consumers significantly at the 5% level. This resolves an important empirical question and concludes that full liberalization is better than partial liberalization.

Finally, Table 4 compares the utility levels of shock therapy strategy and gradualism reform. It can be observed that there is clear a trade-off between the two liberalization strategies. In column (3) of Table 4, the maximum values of the utility differential for both domestic consumers are positive. It shows there are occasions that the shock therapy strategy can make at least one domestic consumer worse-off in comparison with the gradualism strategy. Nevertheless, the gradualism reform cannot be dominant the shock therapy strategy. The minimum values of the utility differential in column (3) of Table 4 for both domestic consumers are all negative. It means that shock therapy strategy can generate better outcome for at least one consumer.

Interestingly, the utility levels of these two strategies are not significantly different at the 5% level for both Chinese and Japanese consumers according to the non-parametric rank test. This implies both full liberalization strategies reach similar final outcomes and cannot be discriminated statistically.

However, this conclusion deserves some qualification if one looks at the columns (1) and (2) in Table 4 carefully. In column (1) of Table 4, the minimum values of the utility differential for both domestic consumers are negative. It shows there are occasions that the shock therapy strategy can make at least one domestic consumer worse-off in comparison with the domestic trade. This implies that the outcomes from shock therapy strategy are not always preferred for the at least one of domestic consumers. That is, the shock therapy strategy is not a Pareto improvement in relation to domestic trade equilibrium.

In contrast, the minimum values of the utility differential in column (2) of Table 4 for both domestic consumers are always positive. This confirms our Proposition 3 that gradualism reform is a Pareto improvement over domestic trade, which is also a Pareto improvement over no-trade

autarky. It clearly shows that the outcome of full liberalization is path-dependent when the financial market is incomplete.

Furthermore, the standard deviation of gradualism reform is lower than that of shock therapy strategy (cf. Table 2), implying that the outcome under this policy is also more stable than the shock therapy approach.

5. Conclusion

Based on a simple incomplete financial market model, this paper demonstrates that the full trade liberalization is path-dependent. Although both shock therapy and gradualism approaches reach to a statistically similar equilibrium with higher utility for all consumers, the gradualism approach may be preferred since it is a Pareto improvement process for domestic consumers. Both the theoretical results and the Monte Carlo simulations confirm this conclusion. The policy implication for a developing economy such as China is profound. It means that the government should open its domestic market for domestic consumers first before opening it to international trade. Domestic trade provides a solid foundation for the domestic consumers to face the opportunity and challenges from the international trade with foreign traders.

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Fig 1. Map of Japan

Tourism is one of Nara's largest industries.

A number of major companies have factories in Shiga such as IBM Japan, Canon.

Tokyo’s GDP of around US$1.315 trillion is greater than the 8th largest national economy in the world. It is a major international/domestic finance center, and serves as a hub for Japan's transportation, publishing, and broadcasting industries.

Source: Servas Japan Organization: www.servas-japan.org/images/japan-trip.gif

Fig 2. Map of China

Table A. Disparity of regional GDP per capita (in '000 US$) in goods and services: China vs Japan

	China			Japan		
sample size	31			47		
	goods	services	total	goods	services	total
statistics	(1)	(2)	(3)	(4)	(5)	(6)
mean	0.834	0.596	1.429	7.909	21.828	29.737
min	0.282 (Guizhou)	0.154 (Guizhou)	0.435 (Guizhou)	3.589 (Tokyo)	16.886 (Nara)	21.796 (Nara)
max	2.913 (Shanghai)	2.732 (Shanghai)	5.645 (Shanghai)	15.655 (Shiga)	53.490 (Tokyo)	57.079 (Tokyo)
st. dev.	0.538	0.587	1.097	2.832	5.317	5.441
Gap ratio (max/min)	10.3	17.8	13.0	4.4	3.2	2.6

Table 1. Heterogeneous preferences, expectations, endowments, and asset returns
(sample size: 1,000)

		Preference	Expectations	Endowments			
				state v		state w	
(A)	Statistics			goods	services	goods	services
		(1)	(2)	(3)	(4)	(5)	(6)
Consumer i	mean	0.4998	0.5003	0.9002	0.7101	0.9165	0.7130
	st. dev.	0.1473	0.1287	0.4562	0.4188	0.4955	0.4158
	min	0.1024	0.1549	0.2820	0.1539	0.2828	0.1549
	max	0.8965	0.8322	2.5391	2.5752	2.6776	2.6661
Consumer j	mean	0.4984	0.5035	0.9098	0.7140	0.9203	0.6960
	st. dev.	0.1492	0.1328	0.4655	0.4205	0.4632	0.4091
	min	0.1124	0.1319	0.2825	0.1536	0.2818	0.1536
	max	0.8895	0.8710	2.8253	2.5787	2.7924	2.0845
Foreigner f	mean	0.5042	0.4965	7.8073	22.7001	7.8525	22.4878
	st. dev.	0.1504	0.1476	2.7816	4.3186	2.8267	4.2695
	min	0.1093	0.1079	3.6109	16.8923	3.6096	16.9094
	max	0.8926	0.8988	15.5328	38.3985	15.5915	43.0573
(B) Asset return	mean			1.4913		0.4994	
	st. dev.			0.1880		0.1543	
	min			1.0016		0.1059	
	max			1.9913		0.8993	

Table 2. Simulated utilities (sample size: 1,000)

		Autarky	International trade under shock therapy	Domestic trade only	International trade under gradualism reform
	Statistics	(1)	(2)	(3)	(4)
Consumer i	mean	-0.3714	0.0378	-0.2810	0.0395
	st. dev.	0.2948	0.3647	0.2760	0.3262
	min	-1.3324	-0.8527	-1.1742	-0.8389
	max	0.5000	1.4256	0.5791	1.1275
	skewness	-0.0326	0.2312	-0.0320	0.0962
	kurtosis	-0.2885	-0.0043	-0.2255	-0.1445
Consumer j	mean	-0.3687	0.0417	-0.2744	0.0435
	st. dev.	0.3049	0.3727	0.2791	0.3326
	min	-1.3513	-0.9348	-1.2973	-0.8747
	max	0.5092	1.5943	0.5290	1.6011
	skewness	-0.0670	0.2073	-0.1373	0.1642
	kurtosis	-0.2729	0.1663	-0.0407	0.3388
Foreigner f	mean	2.5455	2.5542		2.5539
	st. dev.	0.2218	0.2153		0.2156
	min	1.7995	1.8279		1.8238
	max	3.1024	3.10303		3.10304
	skewness	-0.3155	-0.2572		-0.2607
	kurtosis	0.1287	0.0531		0.0587

Table 3. Difference in utility between trade and autarky (sample size: 1,000)

		International trade under shock therapy strategy	Domestic trade only	International trade under gradualism reform
	Statistics	(1)	(2)	(3)
Consumer i	mean	0.4092	0.0905	0.4109
	st. dev.	0.3148	0.0800	0.2465
	min	0.0034	0.0006	0.0216
	max	1.8287	0.6193	1.5555
	skewness	1.2661	1.6791	1.0355
	kurtosis	1.6611	3.9298	1.2096
Consumer j	mean	0.4104	0.0943	0.4123
	st. dev.	0.3140	0.0909	0.2471
	min	0.0034	0.0003	0.0181
	max	1.8126	0.6160	1.5940
	skewness	1.2401	2.0575	1.0220
	kurtosis	1.5918	5.5280	1.2408
Joint test for $u^k_{trade}=u^k_{autarky}$, k=i,j	$\chi^2(2)$	858.23	85.91	858.17
P-value		0.0000	0.0000	0.0000
Foreigner f	mean	0.0088	n.a.	0.0084
	st. dev.	0.0112		0.0108
	min	0.000028		0.000026
	max	0.1277		0.1250
	skewness	4.0799		4.2473
	kurtosis	28.7792		31.4037
Test for $U^f_{trade}=u^f_{autarky}$	$\chi^2(1)$	0.6124		0.5622
	P-value	0.4339		0.4533

Table 4. Difference in utility of various trade reforms (sample size: 1,000)

		Shock therapy strategy vs domestic trade only	Gradualism reform vs domestic trade only	Gradualism reform vs shock therapy strategy
	Statistics	(1)	(2)	(3)
Consumer i	mean	0.3187	0.3204	0.0017
	st. dev.	0.3073	0.2383	0.1793
	min	-0.3528	0.0021	-0.5953
	max	1.5328	1.5124	0.6360
	skewness	1.1029	1.1493	0.0006
	kurtosis	1.3376	1.3711	0.7664
Consumer j	mean	0.3161	0.3180	0.0018
	st. dev.	0.3063	0.2366	0.1822
	min	-0.3939	0.0039	-0.6423
	max	1.6915	1.4887	0.8720
	skewness	1.1092	1.1852	0.2481
	kurtosis	1.5154	1.5395	1.4774
Joint test for $u^k_{trade}=u^k_{autarky}$, k=i, j	$\chi^2(2)$	596.02	618.07	0.2516
	P-value	0.0000	0.0000	0.8818
Foreigner f	mean	n.a.		-0.0004
	st. dev.			0.0011
	min			-0.0119
	max			0.0018
	skewness			-5.0328
	kurtosis			36.4233
Test for $U^f_{trade}=u^f_{autarky}$	$\chi^2(1)$			0.0023
	P-value			0.9616