Volume Title: International Trade in East Asia, NBER-East Asia Seminar on Economics, Volume 14

Volume Author/Editor: Takatoshi Ito and Andrew K. Rose, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-37896-9

Volume URL: http://www.nber.org/books/ito_05-1

Conference Date: September 5-7, 2003

Publication Date: August 2005

Title: Border Delays and Trade Liberalization

Author: Edgar Cudmore, John Whalley

URL: http://www.nber.org/chapters/c10140

12

Border Delays and Trade Liberalization

Edgar Cudmore and John Whalley

12.1 Introduction

In a number of lower income and transitional economies it is common for there to be significant delays at the border when achieving customs clearance. This can be due to complex customs formalities, which sometimes are continually changing, capacity constraints given limited facilities, and/or corruption at the border. In some African economies, there are reported delays of three–six months to achieve customs clearance,[1] although this is perhaps extreme.

Our paper begins with the observation that if such delays are significant and the length of the delay is endogenously determined, then trade liberalization through tariff reductions that increase the length of the queue can be welfare worsening. Tariff reductions, as have occurred in recent years in the Commonwealth of Independent States (CIS), thus appear to be bad policy without first addressing customs clearance issues. We show this for small open-economy cases in a simple general equilibrium model where

Edgar Cudmore is a PhD candidate at the University of Western Ontario. John Whalley is professor of economics and codirector of the Centre for the Study of International Economic Relations, Department of Economics, University of Western Ontario, and a research associate of the National Bureau of Economic Research.

We are grateful to other conference participants and our two discussants for helpful comments. We acknowledge the Gorbachev Foundation for grant support, Natalia Tourdyeva, Ksenia Yudaeva, and Konstantin Kozlov at the Center for Economic and Social Research (CEFIR), Katrin Kuhlmann at the Office of the Special Trade Representative (STR), and Konstantine Loukine at the International Development Research Center (IDRC) for comments, data, and discussion.

1. See the recent WTO Trade Policy Review Mechanism (TPRM) Report on Togo (1999, 30).

there is a physical constraint on the volume of imports that can be admitted. We then analyze extensions where corruption occurs and, finally, where some imports are perishable. We apply our analysis to data on Russian trade for the late 1990s, with the results emphasizing the themes that not only is it best to deal with border and administrative delays first before engaging in trade liberalization but also that the quantitative orders of magnitudes for the costs involved can be large.

12.2 A Model of Trade with Border Delays

The role and significance of border delays for trade liberalization in a number of economies around the world is reflected in anecdotal evidence as to their importance for the trade of Russia and other former Soviet Union countries. Hare (2001, 484), in a recent piece on trade policy in CIS transition economies, says "It is often asserted that inadequate physical infrastructure—roads, railways, and the like—inhibits trade, though solid evidence for this is lacking. More often, the real barrier to trade is again institutional, taking the form of unreasonable customs delays at many borders in the transition economy region, accompanied by widespread demands for bribes to expedite the movement of goods."

The precise length of these delays and even how precisely they arise is unfortunately poorly documented in the literature, but their impact on trade is unquestionable. There is some suggestion in the literature that continual changes in customs legislation and uncertainty as to how they are to be implemented is a key factor. Equally, these delays are also thought to reflect the time taken for negotiations between officials and importers over valuation, which it is thought can fall dramatically through the use of negotiation intermediaries. Bribes seem to be involved in this process. These and other issues in the Russian case are discussed in Beilock (2002) and Wolf and Gurgen (2000). Delays in the range of weeks or months for clearance are often claimed in anecdotes, with six weeks being an approximate mean figure suggested to us for Russia in conversations, although this varies substantially with the port of entry and transportation mode.

12.2.1 A Simple Model

The purpose of our paper is to focus on the interactions between border delays and trade liberalization in light of their seeming importance in these cases. We formalize these interactions in a model of a simple pure exchange economy, which is small, and a taker of prices on world markets and engaged in trade. For expositional simplicity of structure, we assume for now there is no production and all goods are traded (these features can be changed in numerical application). The world prices for the N goods we take as given by the $\overline{\pi}_i^w$. Tariff rates t_i apply to imports ($t_i = 0$ for exports), and we assume the direction of trade is predetermined.[2]

In this economy, domestic prices depart from world prices on the import side both due to tariffs and per-unit queuing costs at the border $T^q(\pi)$. For simplicity, we assume these costs are the same for all goods and that units for goods are denominated in comparable physical terms (e.g., tons). Thus, if M goods are imported and $(N - M)$ exported and the direction of trade is unchanged,

$$\pi_i^d = \pi_i^w(1 + t_i) + T^q(\pi) \quad (i = 1 \ldots M). \tag{1}$$

T^q is assumed to be indexed and so is homogeneous of degree one in π and is endogenously determined.

The economy has market demand functions, $\xi_i(\boldsymbol{\pi}^{\mathbf{d}}, R, Q)$, and nonnegative endowments, w_i, for each of the N goods, where $\boldsymbol{\pi}^{\mathbf{d}}$ denotes the N-dimensional vector of domestic commodity prices. R defines tariff revenues, and Q represents the aggregate endogenously determined queuing costs (denominated in units of the good being imported). These demand functions are nonnegative, continuous, homogeneous of degree zero in $\boldsymbol{\pi}^{\mathbf{d}}$ and satisfy Walras Law, that is, at all price vectors $\boldsymbol{\pi}^{\mathbf{d}}$

$$\sum_{i=1}^{N} \pi_i^d[\xi_i(\boldsymbol{\pi}^{\mathbf{d}}, R, Q) - w_i] = 0. \tag{2}$$

Assuming there is a single representative consumer in this economy, their budget constraint is given by

$$\sum_{i=1}^{N} \pi_i^d \xi_i(\pi^d, R, Q) = \sum_{i=1}^{N} \pi_i^d w_i + R - \sum_{i=1}^{M} T^q(\pi)(\xi_i - w_i). \tag{3}$$

For simplicity, border delays are assumed to reflect a constraint on the volume of imports that can be processed over the period of time covered by the model (e.g., one year). Thus, for now, we consider this to be a physical constraint rather than one reflecting corruption or other considerations. If $\overline{C}$ represents the administratively determined physical capacity constraint on imports, then

$$\sum_{i=1}^{M}[\xi_i(\pi^d, R, Q) - w_i] \leq \overline{C}, \tag{4}$$

where R denotes tariff revenues $\sum_{i=1}^{M} \overline{\pi}_i^w t(\xi_i - w_i)_i$, and $Q = \sum_{i=1}^{M} \pi T^q(\pi)(\xi_i - w_i)$ denotes the total queuing costs.

In this simple model, if the capacity constraint on imports is binding

2. This is a standard assumption in most theoretical trade models, although numerically the direction of trade can change when trade policies change. See Abrego, Riezman, and Whalley (2001) for a recent discussion of the likelihood of this assumption being false in comparisons between free trade, customs unions, and Nash equilibria.

then per-unit queuing costs $T^q(\pi^w)$ are determined in equilibrium along with domestic prices π^d, tariff revenues, and domestic demands ξ_i. The effect of tariff liberalization will be to lower tariff revenues and increase queuing costs. In the case where tariff rates are uniform across commodities, tariff reductions simply generate a corresponding increase in queuing costs. Because the latter use real resources, tariff reducing trade liberalization will typically be welfare worsening.

12.2.2 Model Extensions

This simple model can be extended in a number of ways that capture additional mechanisms through which border delays and trade liberalization can interact.

Corruption

One is the presence of corruption. This can be modeled simply in this framework as the ability of customs officials to extract a bribe for allowing passage of goods. We assume that there is a bound to the bribe, which for simplicity we take to be the ability of an official to send the importer to the back of the line in the event a bribe is not paid. If we assume that officials can only do this once, as otherwise they would reveal themselves as corrupt officials if they repeat the denial of clearance, this means that the bribe that can be extracted by the official is within epsilon of the queuing costs T^q. For simplicity, we take the bribe paid to equal T^q, which will now change relative to the no-corruption case.

The preceding discussion suggests that the queuing costs in the particular formulation outlined previously are halved, with bribes making up the remaining difference between world and domestic prices for imports. Thus, if B represents the bribe paid per-unit import

$$\pi_i^d = \overline{\pi}_i^w(1 + t_i) + T^q + B \tag{5}$$

and by construction $B = T^q$.

This also means that in equation (4) the real resource loss from queuing is halved and exports increase, as fewer export earnings are needed to cover queuing costs. Corruption in this case is thus socially desirable as real resource costs are now partially replaced by a transfer of income to government officials.

Perishability

A further elaboration on the basic model can be used to show how differential impacts of queuing on different commodities can result. One way this can happen is if perishable commodities are more adversely affected by queuing than nonperishable commodities. Differential impacts of border delays across commodities are the end result with added distortionary costs.

We can capture this by defining a variable γ_i, which represents the fraction of goods shipped that actually arrive, where $\gamma_i \leq 1$, and $(1 - \gamma_i)$ is the perish rate for good i.[3] We can then make γ_i a function of the time spent queuing so as to capture the feature that perish rates increase with queuing time.

Thus, for each unit shipped and paid for, only γ_i units actually arrive; or,

$$\pi_i^d = \frac{\pi_i^w(1 + t_i) + T^q}{\gamma_i} \tag{6}$$

and

$$\gamma_i = 1 - \lambda T^q, \tag{7}$$

where λ is a constant, and so perish rates increase with queuing time.

With this formulation, differential impacts of queuing by commodity result and even uniform tariff liberalization now has differential impacts by good.

Other Extensions

Various other extensions to this basic model can also be made, which for space reasons we do not elaborate on in any detail. We can use a model with production rather than a simple pure exchange economy with endowments. We can also incorporate nontraded as well as traded goods. Both of these are standard in numerical general equilibrium models of actual economies (see Shoven and Whalley 1992), although neither changes the basic analytical structure in which queuing costs are endogenously determined.

We can also modify the model set out previously for cases in which different commodities incur different queuing costs per unit weight due to differing administrative procedures. This could arise with valuation procedures being more complex for, say, components for electronic products compared to basic commodities such as coal. This can be done by building in different factors of proportionality into the analysis for queuing costs for the various quantities imported. Again, the essential structure of the model remains unchanged.

12.3 Some Calculations Using Russian Data

Using this simple framework, we have made some calculations using Russian data to explore the possible quantitative orders of magnitude involved with analysis of trade liberalization that incorporate border delays. The delays reported in the Russian case appear to be lengthy and a major

3. Implicitly, the assumption here is that customs clearance only occurs for the nonperished goods (perished goods are disposed of before customs clearance occurs). Alternative formulation under which all goods are cleared for customs and only the nonperished portion is sold could also be used.

restraint on trade. These calculations thus serve to underline the point that if tariff reforms occur with no attention being paid first to administrative considerations and border delays, liberalization can be welfare worsening rather than welfare improving as is usually the case in conventional models rather than providing accurate point estimates of actual impacts. Importantly, they suggest that there are costs rather than benefits from trade liberalization in such cases, and they can be substantial.

To apply the model set out previously to the Russian case, we use constant elasticity of substitution (CES) demand functions and, in addition, specify the model so as to also include both a non-traded goods sector and two traded goods so that distortions between perishable and nonperishable imports can be analyzed. All model variants thus include four goods (an exportable, two importables, and a nontraded good).

We use the standard applied general equilibrium modeling approach of calibration to a base-case data set, followed by counterfactual equilibrium analysis (see Shoven and Whalley 1992). To make our calculations of the impacts of trade liberalization incorporating border delays, we have constructed a benchmark equilibrium data set for Russian trade, consumption, and endowments (taken to equal production) by averaging data for 1997, 1998, and 1999.[4] These are years during which there was substantial variation in Russian trade performance due to the 1998 financial crisis, and using averages in this way partially mitigates extremes in any one year's data. We use tariff data from World Bank sources for 1999,[5] which suggests an approximate average tariff rate across all imports of 10 percent. We assume an average border delay of three weeks in customs clearance (six weeks is the figure often claimed). This is the basis for an approximate estimate that with nondelay shipping times from Western Europe of three days and formal transportation cost in the range of 5 percent (see Hummels [1999] for a recent discussion of the size of transportation costs in trade), delay costs could be in the range of 30 percent of the value of imports. We use this estimate as the base-case value in our computations, making some modifications in the perishability case.

We use calibration methods and this data to determine both share and elasticity parameters in preferences. For the case of CES preferences, demands are given by

$$X_i = \frac{\alpha_i I}{(\pi_i^d)^\sigma \sum_{j=1}^{N} \alpha_j (\pi_j^d)^{1-\sigma}} \quad (i = 1 \ldots N), \tag{8}$$

4. Data on trade and consumption are taken from the 2001 *World Development Indicators.* Data on production by industry (which we use to represent endowments) originates from Goskomstat sources, and we are thankful to Natalia Tourdyeva for providing it for us.

5. Data on tariff rates are taken from the 2001 *World Development Indicators,* published by the World Bank.

where α_i are CES shares, σ is the substitution elasticity, and income, I, is given by

$$I = \sum_{i=1}^{N} \pi_i^d w_i - \sum_{i=1}^{M} T^q(\overline{\pi}_i^w)(\xi_i - w_i). \tag{9}$$

In this case, the import demand elasticity, η_i^m, for import good i is given by

$$\eta_i^m = (-\sigma - S_i(1 - \sigma))\frac{X_i}{(X_i - W_i)} \quad (i = 1 \ldots N), \tag{10}$$

where S_i is the income expenditure share on good i.

These elasticities are not constant and so direct calibration is not possible. The convention in calibration literature is to use a literature estimate and choose σ so that the implied point estimate of the elasticity in the neighborhood of the benchmark equilibrium is literature consistent. If share parameters on imported goods are large, then negative values of σ can result from calibration if import demand elasticities in the neighborhood of one are used. This is common in general equilibrium trade models, as the majority of estimates in the literature are around one (see Erkel-Rousse and Mirza 2002). Not recognizing the significance of nontraded goods can result in this problem as expenditure shares on traded goods are smaller in models with nontraded goods than without them, and this is one reason for including them in the model.

Using GAMS (1996) solution software, we calibrate both the basic model and associated variants to the averaged 1997–1999 benchmark data set. We then evaluate the effects of tariff reform for each model variant by computing counterfactual equilibria that we also compare to the base case. We also use a model variant where no border delays are present, which we term the conventional case. In this event, gains from tariff liberalization occur.

We classify the trade data into importables and exportables based on the sign of net trade flows by commodity. We use equation (8) to calibrate model share parameters from data on consumption and prices, choosing units for goods in the model such that world prices are one. Equation (8) is used jointly in calibration with equation (9), which determines σ given shares, once import price elasticity values are assumed.[6] Our calibrations yield share and elasticity parameter estimates for the basic model variants for assumed values of import price elasticities lying between –1 and –2 (one is the most frequently used in empirical trade models) as set out in table 12.1.

Using models parameterized in this way, we have generated two sets of results that allow us to analyze the interactions between trade liberaliza-

6. We calibrate to the import price elasticity of the first import good, and, as share parameters on the two imports are similar, these two import price elasticities are very close.

Table 12.1 **Calibrated basic model parameters from 1997–1999 Russian data**

		Share parameters in preferences			
Assumed import price elasticity	σ generated by calibration	Imported goods		Exportables	Nontraded goods
–1.0	0.314	0.260	0.220	0.068	0.452
–1.5	0.676	0.276	0.234	0.064	0.426
–2.0	1.038	0.293	0.248	0.060	0.399

Table 12.2 **Impacts of trade liberalization in Russia in the presence of border delays: Models calibrated to averaged 1997–1999 data**

	Basic model with border delays	Extended model with corruption	Extended model with perishability
A. Import price elasticity = –1			
Welfare gain/loss as Hicksian EV as % of income	–0.130	–0.146	–0.134
Impacts on import volumes (% change)	0	0	–0.078 (perishable) 0.017 (nonperishable)
Impacts on export volumes (% change)	0.711	0.920	0.723
B. Import price elasticity = –1.5			
Welfare gain/loss as Hicksian EV as % of income	–0.248	–0.245	–0.253
Impacts on import volumes (% change)	0	0	–0.431 (perishable) 0.095 (nonperishable)
Impacts on export volumes (% change)	1.361	1.550	1.369
C. Import price elasticity = –2			
Welfare gain/loss as Hicksian EV as % of income	–0.343	–0.310	–0.347
Impacts on import volumes (% change)	0	0	–0.989 (perishable) 0.217 (nonperishable)
Impacts on export volumes (% change)	1.887	1.969	1.883

tion and border delays. In table 12.2, we show welfare and trade impacts of liberalization in the basic model with border delays and in two model extensions that incorporate corruption and perishability. These estimates are reported for the three values of assumed import price elasticities used in calibration in table 12.1.

Results in table 12.2 show negative welfare effects of trade liberalization measured in terms of the Hicksian equivalent variation as a percentage of income in all cases. These costs become larger as the assumed price elasticity rises as both substitution elasticities and share parameters change the evaluation of utility pre- and postliberalization changes. Larger impacts on queuing costs across these cases reflect the different share parameters generated by calibration. Costs are smaller in the with-corruption cases, for high elasticities and larger for smaller elasticities. The real resource costs from queuing in corruption cases are approximately one-half of those in no-corruption cases, and in that sense corruption is good in the model. But changes in queuing costs are comparable. Perishability raises costs slightly for all import price elasticity cases. Import volumes only change in the perishability cases. Here, because tariff reductions raise queuing costs and these increase proportionally more for perishable goods, imports of perishable goods fall and imports of nonperishable goods rise.

The second set of results in table 12.3 compares those from the basic model with border delays to those from a more conventional model with no border delays. To make this comparison, we use a case for a conventional tariff model where there are no queuing costs in the base case so that in this model relative price effects of tariff liberalization come into play as tariffs are eliminated and no queuing costs enter. In the comparable border delay model, the capacity constraint on imports remains. A tariff equal to the combined queuing plus tariff wedge in the base model is applied to the conventional model. We then consider a reduction in this tariff by 10 percentage points. In both of these cases, we use an import price elasticity of minus one in calibration. As table 12.3 indicates, the signs of welfare effects are reversed between models, and the absolute values of effects are different.

These simulation results thus clearly show how trade liberalization can be welfare worsening in the presence of border delays. Tariff reductions have little or no impact on domestic prices because of the capacity constraint on processing imports. More queuing results in added real resource costs, rather than generating revenues as is true with tariffs. The presence of corruption tends to weaken these effects as lowered tariffs now increase transfers to corrupt officials with smaller effects on aggregate incomes. Perishability considerations affect the costs of liberalization through more product loss, and added queuing results. And the differences relative to a conventional trade liberalization model are in sign.

This analysis and the simulations reported therefore point to the significant role that border delays can play in influencing the effects of trade liberalization. Without prior attention to administrative procedures and customs

Table 12.3 Comparing result of trade liberalization in Russia using a conventional model and one incorporating border delays, averaged 1997–1999 data

	Conventional model (no border delays)	Basic model with border delays
Import price elasticity = –1		
Welfare gain/loss as Hicksian EV as % of income	0.044	–0.130
Impacts on import volumes (% change)	0.931	0
Impacts on export volumes (% change)	0.614	0.711

clearance, trade liberalization can become welfare worsening by increasing queuing costs. Trade liberalization in CIS states that does not first deal with administrative delays can thus be viewed as potentially counterproductive.

12.4 Directions for Future Work and Broader Policy Implications

While simple, it is worth emphasizing again that the preceding analysis can be potentially misleading if applied mechanically to trade policy reform where border delays operate and that our purpose is more to raise the issue of analytical process in the presence of border delays than to provide a precise forecast of impact.[7] In this concluding section we briefly indicate some of the difficulties with our simple treatment and, in the process, suggest possible directions for future work. Customs procedures, preshipment inspection, and other related issues have been part of World Trade Organizations (WTO) discussions for some time. Our analysis, in part, draws attention to some of the analytical issues with these issues by implicitly arguing that for trade liberalization in many countries around the world to be effective, it needs to be accompanied by administrative reforms.

There are several issues that our simple analytics raise, and more complex formulations can often lead to differing conclusions from the analysis. For instance, we treat $\overline{C}$ as a fixed physical constraint, but if there is instead a cost of processing function at the border, things can change. Liu's papers (1985, 1996), for instance, suggest that if the speed of processing at the border is under the control of customs officials, then more bribes may be able to be extracted than in our treatment of corruption. On the other hand, relaxing the rigid $\overline{C}$ constraint should also lower the costs of induced queuing. In some cases the outcome of trade liberalization may be ambiguous and likely depend on demand elasticities where speed is endogenous and bribes occur. When demands are inelastic, trade liberalization may increase processing costs due to longer delays by rent extracting officials, and vice versa when demands are elastic.

The evaluation of corruption as being welfare improving in this simple structure may also be misleading if induced corruption in the trade sector leads to spreading corruption elsewhere in the economy. Our simple analysis assumes only that bribes substitute for tariffs at no economic cost. If corruption is costly, liberalization need not be welfare worsening, and cases where imperfect substitutes are involved will also need to be considered.

The fixed production assumption in the model misses further issues. This assumption may lead to an underestimate of the welfare gains from tariff liberalization by ignoring production side effects and could equally overstate the gains from corruption. There are also no externalities from cor-

7. We are grateful to Francis Lui, Chong-Hyun Nam, and Andrew Rose for many of the observations and points in this section.

ruption present in the analysis and, hence, wider implications for the rule of law are not discussed.

At the end of the day, however, our analysis suggests that border delays and customs procedures (with associated links to processes of corruption) are perhaps more important for contemporary trade analysis than currently recognized and highlight the need to move beyond tariff-based discussions in numerical work on trade liberalization impacts. The specifics of such analyses will vary from case to case.

References

Abrego, L., R. Riezman, and J. Whalley. 2001. How reasonable are the assumptions used in theoretical models?: Computational evidence of the likelihood of trade pattern changes. NBER Working Paper no. 8169. Cambridge, MA: National Bureau of Economic Research, March.

Beilock, R. 2002. Will new roads help? Institutional barriers to international transport in eastern Europe and the CIS. University of Florida, Department of Food and Resource Economics. Mimeograph.

Erkel-Rousse, H., and D. Mirza. 2002. Import price elasticities: Reconciling the evidence. *Canadian Journal of Economics* 35 (2): 282–306.

Hare, P. G. 2001. Trade policy during the transition: Lessons from the 1990s. *The World Economy* 24 (4): 484.

Hummels, D. 1999. Have international trade costs declined? University of Chicago, Graduate School of Business. Mimeograph.

Lui, F. T. 1985. An equilibrium queuing model of bribery. *Journal of Political Economy* 93 (4): 760–81.

———. 1996. Three aspects of corruption. *Contemporary Economic Policy* 14 (3): 26–29.

Shoven, J. B., and J. Whalley. 1992. *Applying general equilibrium.* Cambridge, UK: Cambridge University Press.

Wolf, T., and E. Gurgen. 2000. Improving governance and fighting corruption in the Baltic and CIS countries: The role of the IMF. *Economic Issues* 26:1–17.

World Trade Organization (WTO). 1999. *Trade policy review: TOGO 1999.* Geneva, Switzerland: WTO.

Comment Francis T. Lui

Cudmore and Whalley have constructed a model that reminds us of an interesting possibility in international trade. Trade liberalization, if not preceded by some institutional reforms, could result in welfare worsening. The

Francis T. Lui is a professor of economics and director of the Center for Economic Development at the Hong Kong University of Science and Technology.

institutional factor being studied here is the capacity constraint on the amount of goods that can be cleared at the customs at any period of time. Liberalization lowers prices and increases the quantity demanded for imported goods. Because of the capacity constraint, people will spend more real resources and waiting time for customs clearance. The loss in welfare can be partly mitigated if bribes, which are transfer payments, are used to shorten the waiting time for some people. If the goods have different degrees of perishability, a uniform reduction in tariffs could increase the costs of delays differentially.

The model constructed is that of general equilibrium. This has the advantage that the calibrated results for estimating the quantitative effects of various scenarios are more reliable. However, we can easily get the main theoretical results by simply using an extremely simple partial equilibrium model to tell the story.

In figure 12C.1, D represents the demand curve for the traded good and C^* is the capacity constraint at the customs. When the price is P_1, the real resource loss due to waiting, as is well known, is P_1ABF. If the price is P_2, real resource loss is P_2ABE. However, when corruption is possible, people can pay bribes to compete for the good rather than relying on waiting. The price mechanism is partially restored, and the real resource loss is obviously reduced.

The issue of perishability is similar to the question of differential time costs in the literature of queuing theory and bribery. When people waiting in line have different values of time, those who have higher values can pay greater bribes so that they can be served sooner. This again introduces an element of the pricing mechanism into the allocation process and improves

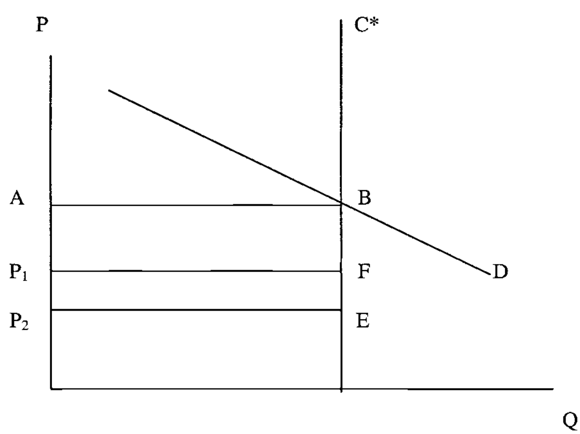

Fig. 12C.1 Partial equilibrium analysis of the Cudmore-Whalley model

welfare. Governments dealing with the problem that goods waiting at the customs are perishable can legalize bribery. This can be done by simply creating priority queues, where the waiting time depends on whether some fees have been paid. Trade liberalization of perishable goods should be accompanied by the introduction of priority queues.

The paper treats capacity constraint as exogenous. In the real world, this is often not the case. The quantity of goods that can be processed at the customs depends very much on how fast the officers want to work. A natural extension of the model is to ask how C^* responds to corruption and trade liberalization.

In Lui (1985), I show that corruption generally increases the speed of the service provided by the officers. Without corruption, they have little incentive to work hard. C^* is therefore small. The high waiting costs will discourage people from joining the queue. When officers can accept bribes, they want to attract more customers. This can be done by their working faster. C^* therefore increases. By doing so, officers can increase the total value of the bribes they can get.

The effect of trade liberalization on C^* is ambiguous. Assume that given any price level for a good, the capacity constraint C^* is always chosen in such a way that the officer can maximize the bribes he receives. The latter can be represented by the area of P_1ABF in the figure, when the price is P_1. Now let trade liberalization reduce the price to P_2. Will the optimal C^* increase or not? The answer generally depends on the elasticity of demand for the good. In the case of constant price elasticity, it can easily be shown that trade liberalization causes C^* to fall, provided that demand is inelastic. As a result, corrupt officers will slow down their service. However, when demand for the good is elastic, liberalization will lead to a higher value of C^* because the officers will work faster. Thus, introducing endogeneity to C^* can enrich the model's implications.

The welfare-improving property of corruption in this model is partly due to the static nature of the analysis. If corruption is possible, officers at the customs are in a position to receive bribe payments. This will induce rent-seeking activities through which people can compete for those officer positions. At equilibrium, the possible real resource saved by bribe transfers will be completely depleted by costly rent-seeking activities aimed at acquiring the officer positions. Thus, in the long run, there is no gain in welfare when corruption is allowed.

To summarize, the paper is stimulating. It can be extended in many ways.

Reference

Lui, Francis T. 1985. An equilibrium queuing model of bribery. *Journal of Political Economy* 93 (4): 760–81.

Comment Chong-Hyun Nam

This is an excellent paper, one that greatly increases our understanding of the role of border delays and corruption in relation to trade liberalization. The message of the paper is very clear: any trade liberalization can become welfare worsening by increasing queuing costs. On the other hand, corruption can be welfare improving if queuing costs are replaced by income transferring bribes. The paper tries to prove these theses both by constructing a model and by applying the model to the Russian data.

I think the subject of the paper is very timely indeed, since a more broad issue of trade facilitation, which includes border delay problems, has become a hot topic for negotiation in recent years both at the Asia-Pacific Economic Cooperation (APEC) and at the World Trade Organization (WTO) levels.

Costs related to trade facilitation have long been thought an important factor that determines transaction costs in international trade, along with such traditional factors as tariff and nontariff barriers and transportation costs. Among these factors, however, tariff and nontariff barriers have been losing their significance as major impediments to trade through successive General Agreement on Tariffs and Trade/World Trade Organization (GATT/WTO) rounds, while transportation costs have also been decreasing over time due to technological innovations and increasing shipping capacities. As a result, the relative importance of trade facilitation or border delays has become much more conspicuous and, hence, deserves greater attention than before. This paper is focused on this issue.

I have three comments to make. The first one is about the capacity constraint on imports as given in equation (4) in the paper, which is presumably the main source of border delays. This capacity constraint may prove to be too strong an assumption, I suppose. This is because, with the capacity constraint, any import liberalization amounts to replacing import tariffs simply by some tariff-equivalent import quotas, leaving no change in import volumes. This capacity constraint assumption later on leads to empirical results that import liberalization has no impact at all on import volumes, as shown in table 12.2 in the paper. I have difficulty following the logic that import liberalization can increase queuing costs while it has no impact on import volumes.

I wonder, therefore, if there is a way either to relax the capacity constraint assumption or to replace the capacity constraint equation by some queuing costs equation that is expressed as a function of import volumes.

My second comment concerns the role of corruption. As expressed in equation (5) in the paper, a bribery variable enters into the equation where a bribe can successfully replace or substitute queuing costs with no eco-

Chong-Hyun Nam is a professor of economics at Korea University.

nomic costs as a bribe represents an income transfer from importers to officials. This leads to an automatic conclusion that corruption is welfare improving.

Well, I have some sympathy with this conclusion. Corruption can be quite effective sometimes in making officials work harder and for longer hours and thereby helps to expand the import capacity constraint or reduces queuing costs. We used to call such a bribe an express fee in Korea. Officials are collecting private taxes or getting paid for their extra services provided to the importers!

Corruption, however, can be welfare worsening, too. Above all, it is illegal and, hence, causes external diseconomies to the society. Even if there is no legality problem, it can entail social costs, as officials may sabotage their normal work duties in order to incite importers to bribe them. To put it differently, they may not like to move before they are getting bribed. In an extreme case, if there are markets developed for corruption and they are perfectly competitive, importers may end up wasting real resources for bribing as much as gains expected from the bribing, for example, by hiring expensive lobbyists or ex-government officials.

My final comment is about the assumption of fixed productions in the model, initially given as endowments so that they cannot change despite trade liberalization. This assumption, no doubt, would have contributed to an underestimation of welfare gains expected from trade liberalization, as shown in table 12.3 in the paper.

On balance, there are good reasons to believe that empirical results obtained in the paper represent a gross underestimation for potential welfare gains from trade liberalization and an overestimation for welfare gains expected from corruption. I am worried that such results may provide the wrong signals to Russian policymakers or the public that trade liberalization is only trivially important, whereas corruption is not all that bad. Do we need to send such a signal to Russia, which is already suffering from rampant corruption?