COE-RES Discussion Paper Series
Center of Excellence Project
The Normative Evaluation and Social Choice of
Contemporary Economic Systems

Graduate School of Economics and Institute of Economic Research
Hitotsubashi University

COE/RES Discussion Paper Series, No.27
February 3, 2004

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WTO as an International Institution to Give Moral Support

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December 2003

Abstract

We investigate the role of WTO on international cooperation in trade policies. Cooperation under the auspices of WTO makes countries feel more obliged to keep agreements. That is to say, the existence of WTO increases "psychological" costs of deviation from international agreements. Using the concept of Kandori's (2003) "morale equilibrium," we formalize this idea and show how WTO may facilitate international cooperation. First, we show that the existence of WTO enables countries to achieve deeper cooperation by raising psychological costs of deviation. But these psychological costs themselves evolve as countries occasionally deviate from agreements due to their domestic concerns. A country's deviation would lower the morale, which in turn reduces every country's future psychological costs of deviation. Therefore, each country has less incentive to deviate since it would increase the future probability of further deviation by all countries. Nevertheless, domestic factors occasionally induce countries to deviate from agreements, so the morale is easy to erode. Launching a new multilateral negotiation under WTO may be effective in setting new morale and hence reducing the probability of collapse of international cooperation.

JEL Classification: F13, C73
Keywords: international obligation, morale equilibrium, tariff cooperation.

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1 Introduction

Building an organization helps involved parties achieve mutual cooperation. However, it is often difficult to always maintain high performance of organizations. Perhaps the most serious danger to the system is internal defiance. Keeping the system itself becomes difficult if many parties act selfishly in defiance of the rules. WTO is not an exception. It seems obvious that without the GATT/WTO system, countries would not be able to keep the current level of cooperation on trade-related issues. Nevertheless, it is difficult to maintain a high binding power of WTO in the circumstances that many countries explicitly or implicitly violate past agreements.

The binding power of WTO, or any other organization, may arise from both material and psychological concerns of the member countries. Dixit (1987) formalizes the idea that the threat of future punishments prevents countries from deviating from trade agreements. The agreements between material-payoff maximizing countries are self-enforcing with a trigger strategy such that any deviation triggers a future trade war. Since any agreements in that framework are self-enforcing, there is little room left for WTO to actively participate in international cooperation. Maggi (1999) emphasizes that WTO enhances multilateral enforcement mechanism so that it facilitates international cooperation when there exists some kind of imbalances in bilateral trade relationships. Kovenock and Thursby (1992) are the first to introduce psychological factor in the analysis of international trade agreements. They argue that countries feel "international obligation" when they cooperate under the auspices of GATT/WTO. Due to this factor, countries incur psychological costs when they breach an agreement in addition to the resulting future material costs (in the punishment phase). Since countries have less incentive to breach an agreement, international obligation created by the existence of GATT/WTO facilitates international cooperation.

In this paper, we extend the idea introduced by Kovenock and Thursby (1992) by spotlighting the role of WTO to give moral support to the member countries. As Kovenock and Thursby (1992) formalizes, countries may well feel more obliged to keep agreed-upon

tariff rates under the auspices of WTO. Countries incur psychological costs if they deviate from an agreement. Unlike Kovenock and Thursby (1992), however, we allow the morale, which can be thought of as the marginal psychological costs, to evolve reflecting countries' past and present actions. Moreover, our cooperation mechanism does not involve explicit punishment that follows immediately and automatically from a breach of an agreement. Our model accords with the observation that immediate retaliation to a deviation rarely occurs in reality. To analyze this function of WTO, we adopt the concept of "morale equilibrium," developed by Kandori (2003). We find that countries can select low, cooperative, tariff rates even without any explicit punishment scheme. The morale of countries evolves if the agreement must specify a particular tariff rate for each country irrespective of that country's domestic concerns. Countries occasionally deviate from the agreed-upon tariff rate. Such deviations lower the morale, which invites further deviations in the future. Due to this domino effect, the morale is easy to erode. We also examine the roles of safeguards and continuing GATT/WTO negotiation rounds in this context. We find that the safeguards policy facilitates cooperation as Bagwell and Staiger (1990) and Ethier (2002) argue in different contexts. Continuing negotiation rounds also facilitates cooperation by refreshing the morale of countries.

2 The Basic Model

We consider tariff settings by n symmetric countries that produce and consume some non-numeraire goods in addition to a competitively produced numeraire good. Countries are populated by the same number of identical consumers whose preferences are characterized by a quasi-linear utility function in which the consumption of the numeraire good enters linearly. Owing to the quasi-linearity of the utility function, social welfare of each country can be measured by the total surplus derived in the markets of the non-numeraire goods. We consider the situation in which the total surplus of each country can be represented by the sum of the import surplus that is a function of its own tariff rate and the aggregate

export surplus, each of whose component is a function of a foreign country's tariff rate. Since there are $n-1$ foreign countries, the aggregate export surplus can be written as the sum of $n-1$ components of the export surplus. We assume that all these components of the export surplus are symmetric.[1] We also suppose that every country is exposed to a country-specific demand or supply shock in each period of infinite horizon. We assume for simplicity that any shock in a country only affects that country's import surplus.[2]

Let τ_t^i denote Country i's tariff rate on the non-numeraire good in period t, and $\tau_t^{-i} \equiv (\tau_t^1, \cdots, \tau_t^{i-1}, \tau_t^{i+1}, \cdots, \tau_t^n)$ denote the tariffs of all other countries. We assume for simplicity that countries do not impose tariffs on the numeraire good. The country-specific shock is represented by the common random variable θ with the support $[\underline{\theta}, \overline{\theta}]$. The realization of this random variable in Country i in period t is denoted by θ_t^i. Then we express Country i's import surplus by $M(\tau_t^i, \theta_t^i)$ and its export surplus derived from its export to Country $j \neq i$ by $X(\tau_t^j, \theta_t^j)$. Notice that the functions M and X are common to all countries by symmetry. Due to the terms-of-trade effect or the rent-shifting effect, M is increasing at $\tau_t^i = 0$ for any θ_t^i. We assume that M is concave and has a unique maximum with respective to τ_t^i for any θ_t^i. Moreover, θ is defined so that M is increasing in θ_t^i. We further assume that $\frac{\partial M}{\partial \tau_t^i}(\tau_t^i, \theta_t^i)$ is also increasing in θ_t^i to capture the idea that an increase in import demands raises Country i's incentive to set a higher tariff. On the other hand, the export surplus derived from Country $j \neq i$, $X(\tau_t^j, \theta_t^j)$, is decreasing in τ_t^j and increasing in θ_t^j. With these functions, we express

[1] Many important models satisfy these requirements. Suppose there are n non-numeraire goods such that every country produces all these n goods but each good is consumed by one and only one country. The separability requirements are satisfied in this case if a consumer's preferences are additively separable with respect to the non-numeraire goods and these goods are competitively produced. The requirements are also satisfied even in the case where the non-numeraire good industry is imperfectly competitive if the markets are segmented by national borders. In this case, the surplus derived from the domestic market is considered as the import surplus while the surplus derived from the foreign markets is considered as the export surplus. We should emphasize, however, that our analysis can be applied to many other trade situations with appropriate modifications. In particular, we make the assumption of symmetry only to simplify the exposition of the analysis.

[2] In the former example of perfectly competitive goods in footnote 1, such shocks can be either production or consumption shocks to the importable good industries. In the latter example of imperfectly competitive goods, shocks should be on consumption since domestic production shocks would also affect the export surplus.

Country i's social welfare by

$$W(\tau_t^i, \tau_t^{-i}, \theta_t) = M(\tau_t^i, \theta_t^i) + \sum_{j \neq i} X(\tau_t^j, \theta_t^j),$$

where $\theta_t = (\theta_t^1, \cdots, \theta_t^n)$. The final assumption that we make on W is that W is jointly decreasing in all its tariff arguments:

$$\frac{d}{d\tau}\left[M(\tau, \theta_t^i) + \sum_{j \neq i} X(\tau, \theta_t^j)\right] < 0, \quad \text{for any } \theta_t.$$

That is, mutual reduction of tariff rates is Pareto improving.

In addition to the material payoff described above, the per-period payoff for the government of each country involves a psychological factor. Let m and k_t denote an agreed-upon tariff rate and the psychological marginal cost, or the morale, in period t, respectively. Then, we express Country i's per-period payoff by

$$u(\tau_t^i, \tau_t^{-i}, k_t, m, \theta_t) = W(\tau_t^i, \tau_t^{-i}, \theta_t) - k_t[\tau_t^i - m]_+,$$

where $[x]_+ = \max\{x, 0\}$. A country will incur psychological costs if it selects its tariff rate above an agreed-upon level. The size of such costs depends on k_t that in general evolves reflecting the history of all countries' tariff setting behavior.

Now, we can derive the one-shot morale equilibrium. We define the morale equilibrium in this context such that $\hat{\tau} = (\hat{\tau}^1, \cdots, \hat{\tau}^n)$ is the morale equilibrium if for any i and τ_t^i, $u(\hat{\tau}^i, \hat{\tau}^{-i}, k_t, m, \theta_t) \geq u(\tau_t^i, \hat{\tau}^{-i}, k_t, m, \theta_t)$. To derive the morale equilibrium, we first observe that

$$\frac{\partial u}{\partial \tau_t^i}(\tau_t^i, \tau_t^{-i}, \theta_t) = \begin{cases} \frac{\partial M}{\partial \tau_t^i}(\tau_t^i, \theta_t^i) - k_t & \text{if } \tau_t^i > m \\ \frac{\partial M}{\partial \tau^i}(\tau_t^i, \theta_t^i) & \text{if } \tau_t^i < m. \end{cases} \tag{1}$$

The function u is not differentiable with respect to τ_t^i at $\tau_t^i = m$. But it is immediate that the right-hand derivative equals the first line of (1) and the left-hand derivative equals the second line of (1), both evaluated at $\tau_t^i = m$.

To express the morale equilibrium, we define $\tau^*(k, \theta_t^i)$ as τ_t^i that satisfies $\frac{\partial M}{\partial \tau_t^i}(\tau_t^i, \theta_t^i) = k$. Since $\frac{\partial M}{\partial \tau_t^i}$ is decreasing in τ_t^i and increasing in θ_t^i, we have that τ^* is decreasing in k and

increasing in θ_t^i. Figure 1 depicts two of such tariffs, $\tau^*(k, \theta_t^i)$ and $\tau^*(0, \theta_t^i)$, which are given as the tariff rates that yield k and 0 as the values of $\frac{\partial M}{\partial \tau_t^i}(\cdot, \theta_t^i)$. We also define $\hat{\theta}(k)$ as θ_t^i that satisfies $\tau^*(k, \theta_t^i) = m$. That is, the marginal import surplus is exactly equal to k when $\theta_t^i = \hat{\theta}(k)$. Since τ^* is decreasing in k and increasing in θ_t^i, we have that $\hat{\theta}(k) < \hat{\theta}(k')$ for any $k < k'$.

Figure 1 depicts $\frac{\partial M}{\partial \tau_t^i}$ and the marginal psychological costs that is k for $\tau_t^i > m$ and 0 for $\tau_t^i \leq m$. As the figure suggests, Country i selects m for multiple contingencies. Since the best responses do not depend on other countries' tariff selection as (1) shows, we find the morale equilibrium such that for any i,

$$\hat{\tau}^i = \begin{cases} \tau^*(0, \theta_t^i) & \text{if } \theta_t^i < \hat{\theta}(0) \\ m & \text{if } \hat{\theta}(0) \leq \theta_t^i \leq \hat{\theta}(k_t) \\ \tau^*(k_t, \theta_t^i) & \text{if } \theta_t^i > \hat{\theta}(k_t). \end{cases}$$

Notice that $\tau^*(0, \theta_t^i)$ is the Nash equilibrium tariff rate when countries only care about the material payoffs. In the presence of psychological factors, countries select a tariff rate lower than this level in general. If the demand level is low ($\theta_t^i < \hat{\theta}(0)$) in the current period, the Nash equilibrium tariff rate with only material payoffs falls short of the agreed-upon tariff rate. In this case, the country will select the Nash equilibrium tariff rate. If the demand level is in an intermediate range ($\hat{\theta}(0) \leq \theta_t^i \leq \hat{\theta}(k_t)$), the country optimally selects the agreed-upon tariff rate. If the demand level is high ($\theta^i > \hat{\theta}(k_t)$), the country is better off to violate the agreement. Even in this case, however, the country's tariff rate is lower than the Nash equilibrium tariff rate with only material payoffs due to the existence of psychological factor.

The strength of the psychological factor, expressed by the marginal psychological costs k_t, may well evolve reflecting countries' past and present actions. Countries' upward deviations from the agreed-upon tariff rate are expected to lower k_t as the morale deteriorates within the international society. However, the morale may be strengthened again if the world observes less or no deviations. We formalize this idea by specifying the function K that determines the law of motion for k_t. Let $d_t \equiv \sum_{j=1}^n [\tau_t^j - m]_+$ denote the total upward deviations in period t. We restrict k_t to the closed interval $[0, \bar{k}]$ for any $t = 1, 2, \cdots$, the marginal psychological

costs $t+1$ is given by

$$k_{t+1} = K(d_t, k_t),$$

where K is decreasing in d_t and increasing in k_t. As Figure 2 depicts, we assume that $K(0, k_t) \geq k_t$ with equality when $k_t = \bar{k}$, reflecting our presumption that the morale recovers if there is no deviation in the current period. As d_t increases, the graph of $K(d_t, \cdot)$ shifts down and approaches 0 for any k_t. It is also natural to assume that $K(d_t, k_t) \leq k_t$ with equality when $k_t = 0$ if d_t is higher than a critical level. The graph of $K(d', \cdot)$ in Figure 2 shows an example of such cases that the morale deteriorates if the current deviations from the agreement are large. If d_t is in an intermediate range, say d'', such deviation is likely to reduce the morale if the current morale is very high. Whereas the same deviation is considered as minor so that it may increase the morale if the current morale is very low. In such a case, therefore, there is a fixed point of $K(d_t, \cdot)$. Assuming $0 < \frac{\partial K}{\partial d_t} < 1$, we see that the fixed point is unique, say k'' in Figure 2, and that $k_{t+1} > k_t$ if $k_t < k''$ and $k_{t+1} < k_t$ if $k_t > k''$. The morale erodes more easily when the current morale is high.

3 Sustainability of International Tariff Agreements

The current level of the marginal psychological costs affects countries' tariff settings, which in turn affect the marginal psychological costs in the future. Countries select their individual tariffs taking account of these chain reactions. In this section, we derive the Markov perfect morale equilibrium in which each country, say i, selects $\tau_t^i = \tilde{\tau}(k_t, m, \theta_t^i)$ provided that the agreed-upon tariff rate equals m.

The value function that represents the present discounted payoffs for a representative country in the Markov perfect morale equilibrium is given by

$$\begin{aligned} &V(k_t, m, \theta_t) \\ &= \max_{\tau_t^i} \Big\{ u(\tau_t^i, \tilde{\tau}^{-i}(k_t, m, \theta_t^{-i}), k_t, m, \theta_t) \\ &\qquad + \delta E_\theta \left[V(K([\tau_t^i - m]_+ + \sum_{j \neq i} [\tilde{\tau}(k_t, m, \theta_t^j) - m]_+, k_t), m, \theta) \right] \Big\}, \end{aligned} \tag{2}$$

where $\tilde{\tau}^{-i}(k_t, m, \theta_t^{-i})$ with $\theta_t^{-i} = (\theta_t^1, \cdots, \theta_t^{i-1}, \theta_t^{i+1}, \cdots, \theta_t^n)$ denotes the $(n-1)$-tuple of $\tilde{\tau}(k_t, m, \theta_t^j)$ for $j \neq i$. Letting $d(k_t, m, \theta_t) = \sum_{j=1}^n [\tilde{\tau}(k_t, m, \theta_t^j) - m]_+$ denote the total upward deviations in equilibrium, we can write the first order condition for the maximization problem in (2) as

$$\frac{\partial M}{\partial \tau_t^i}(\tau_t^i, \theta_t^i) - k_t + \delta E_\theta \left[\frac{\partial V}{\partial k_{t+1}}(K(d(k_t, m, \theta_t), k_t), m, \theta) \frac{\partial K}{\partial d_t}(d(k_t, m, \theta_t), k_t) \right].$$

if $\tau_t^i > m$ and $\frac{\partial M}{\partial \tau_t^i}(\tau_t^i, \theta_t^i)$ if $\tau_t^i < m$. They are also the right-hand and left-hand derivatives at $\tau_t^i = m$, respectively. We immediately find that compared with (1), the derivatives are the same if $\tau_t^i < m$, but if $\tau_t^i \geq m$ the marginal costs of raising the tariff is higher in the current intertemporal setting by

$$c(k_t, m) \equiv -\delta E_\theta \left[\frac{\partial V}{\partial k_{t+1}}(K(d(k_t, m, \theta_t), k_t), m, \theta) \frac{\partial K}{\partial d_t}(d(k_t, m, \theta_t), k_t) \right],$$

which is positive at least in the case where m is set at a relatively high level so that countries seldom select their tariff rates higher than m. An increase in the marginal psychological costs induces further cooperation among countries, which is beneficial to all countries. The only negative factor is that an increase in the marginal psychological costs may increase total psychological costs upon deviation. The former positive effect outweigh the latter negative effect if the probability of deviation is low. Moreover, the total psychological costs may even decrease as a consequence of a rise of the marginal psychological costs when the latter is large, since then a decrease in the total psychological costs caused by the resulting decrease in the size of deviation may outweigh the direct effect of raising the marginal psychological costs.

The Markov perfect morale equilibrium strategy is then given by

$$\tilde{\tau}(k_t, m, \theta_t^i) = \begin{cases} \tau^*(0, \theta_t^i) & \text{if } \theta_t^i < \hat{\theta}(0) \\ m & \text{if } \hat{\theta}(0) \leq \theta_t^i \leq \hat{\theta}(k_t + c(k_t, m)) \\ \tau^*(k_t + c(k_t, m), \theta_t^i) & \text{if } \theta^i > \hat{\theta}(k_t + c(k_t, m)). \end{cases}$$

Countries' deviations would lower the morale, which further invites more future deviations. Moreover, the size of deviation becomes larger as the binding power decreases, which in

turn decreases the binding power more than otherwise. Correctly recognizing these effects, countries deviate in fewer occasions with smaller size of deviation when the morale evolves intertemporally. We also note that deviations from the agreement have a domino effect: a deviation will induce more future deviation. The morale is easy to erode.

Having derived the Markov perfect morale equilibrium, we can discuss the optimal choice of the tariff rate that countries agree to keep. Let us first derive the Pareto optimal state contingent tariff agreement, in which the agreement is expressed as a function of each country's shock, i.e., the agreed-upon tariff rate of Country i in period t can be written as $m^s(\theta_t^i)$. We represent Country i's Markov perfect morale equilibrium strategy in this case by $\tilde{\tau}^s(k_t, \theta_t^i)$, and the $(n-1)$-tuple of the Markov perfect morale equilibrium strategies of other countries than i by $(\tilde{\tau}^s)^{-i}(k_t, \theta_t^{-i})$. Letting V^s denote the value function in this case, we have

$$\begin{aligned} &V^s(k_t, m^s, \theta_t^i) \\ &= \max_{\tau_t^i} \quad \Big\{ u(\tau_t^i, (\tilde{\tau}^s)^{-i}(k_t, \theta_t^{-i}), k_t, m^s(\theta_t^i), \theta_t) \\ &\qquad +\delta E_\theta \left[V^s(K([\tau_t^i - m^s(\theta_t^i)]_+ + \sum_{j \neq i} [\tilde{\tau}^s(k_t, \theta_t^j) - m^s(\theta_t^j)]_+, k_t), m^s, \theta) \right] \Big\}. \end{aligned}$$

Given the Markov perfect morale equilibrium strategy characterized in this equation, it is optimal to set $m^s(\theta_t^i)$ at the smallest tariff rate from which Country i will not deviate. Then there will be no deviation in equilibrium, so that the marginal psychological costs can be kept at the highest level $\bar{k}$. Consequently, the marginal future costs of deviation can be written as

$$c^s(\bar{k}) \equiv -\delta E_\theta \left[\frac{\partial V^s}{\partial k_{t+1}}(\bar{k}, m, \theta) \frac{\partial K}{\partial d_t}(0, \bar{k}) \right].$$

Thus, we find that the optimal state contingent agreement $m(\theta^i)$ can be given by

$$m^s(\theta_t^i) = \tau^*(\bar{k} + c^s(\bar{k}), \theta_t^i).$$

Countries conform to the optimal state contingent agreement, which enables them to keep the highest morale. They can achieve a high level of cooperation as a result. In reality, however, it is difficult to implement this agreement since countries must keep monitoring other countries' state contingent tariff policies.

A more practical tariff agreement is to select m irrespective of demand shocks. Let us suppose that when countries agree on the level of m and implement this agreement in period 1, the binding power of the agreement is at the highest level, i.e. $k_1 = \bar{k}$. Then the Pareto optimal choice of m is the level that maximizes $E_\theta[V(\bar{k}, m, \theta)]$, where V is characterized by (2). Countries can set m at a high level so that no country would deviate in any occasion. Although they can keep the highest morale then, this agreement is inefficient since the fruit from cooperation is very limited. Therefore the Pareto optimal agreement allows each country to deviate from the agreement when the country observes a high import demand shock. In general, the morale deteriorates occasionally, and the deterioration may accelerate at one time in the future with some small probability due to the domino effect that is described above.

4 WTO Rules to Facilitate International Cooperation

In this section, we show that the safeguards policy and continuing GATT/WTO trade negotiation rounds facilitate international tariff cooperation.

Safeguards in our context are considered as a system to allow countries to deviate from an agreed-upon tariff if and only if they observe high import demand shocks. More specifically, the agreement m is tailored so that m takes a fixed number, say $\bar{m}$, if the demand shock is lower than a critical level, but it is a state contingent plan just as we described in the previous section if the demand shock exceeds the critical level. Then, "deviations" from $\overline{m}$ when the demand shock is high are now considered to be legal in the WTO framework, so that they are not likely to lower the morale. Consequently, countries can keep the highest binding power and enjoy the fruit from deeper cooperation.

Continuing GATT/WTO negotiation rounds also play a positive role. Here we focus on two aspects of GATT/WTO rounds. First, the conclusion of a round may refresh countries' attitudes to international cooperation. As we have shown, the morale is easy to erode over time. Continuing GATT/WTO rounds enable the cooperation framework to restart with

the morale reset at the highest level. Second, a new round may include new issues to be negotiated, as the GATT/WTO history suggests. The morale is affected by any deviation in any industry that is included in the agreement. As countries add a new agreement on a new issue, such as tariff cooperation in an industry that has not been included in the past agreement, the number of industries that would be affected by a country's deviation in one industry increases. A resulting rise in the future costs of deviation gives countries more incentives to keep agreements. Consequently, countries can even lower the tariff rates that have been agreed upon in previous negotiations. This last phenomenon accords with the history of the actual GATT rounds.

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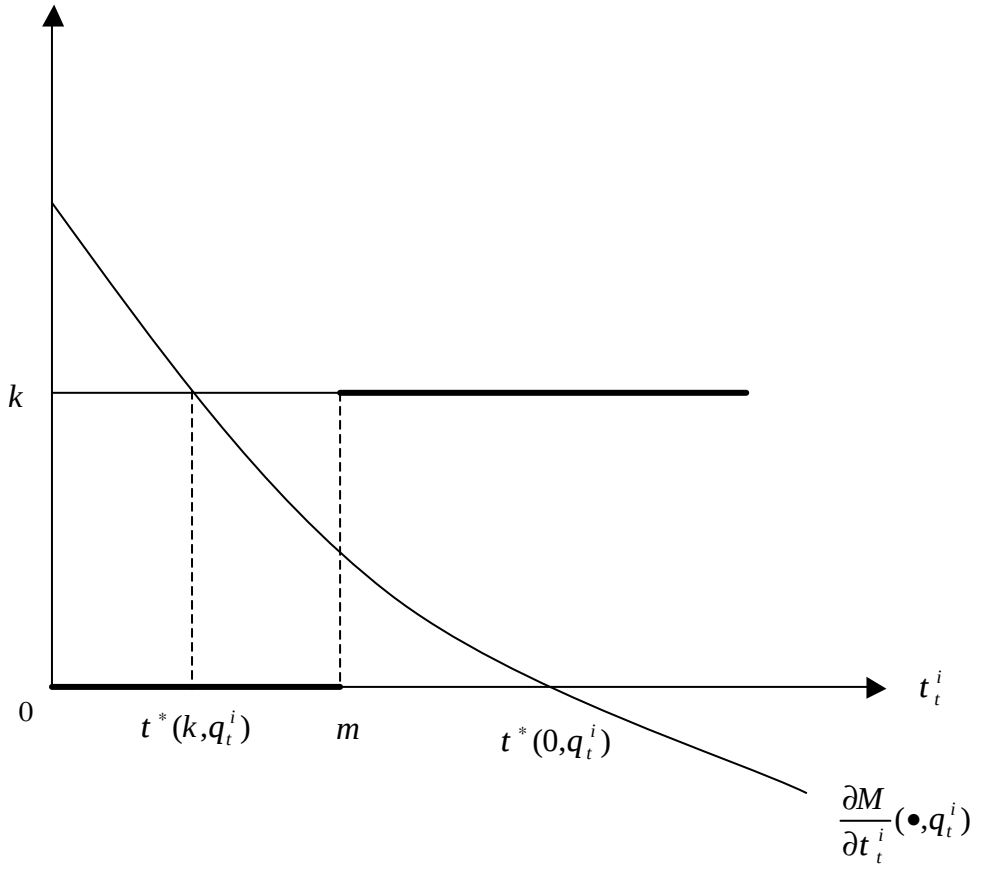

Figure 1. The Morale Equilibrium Strategy

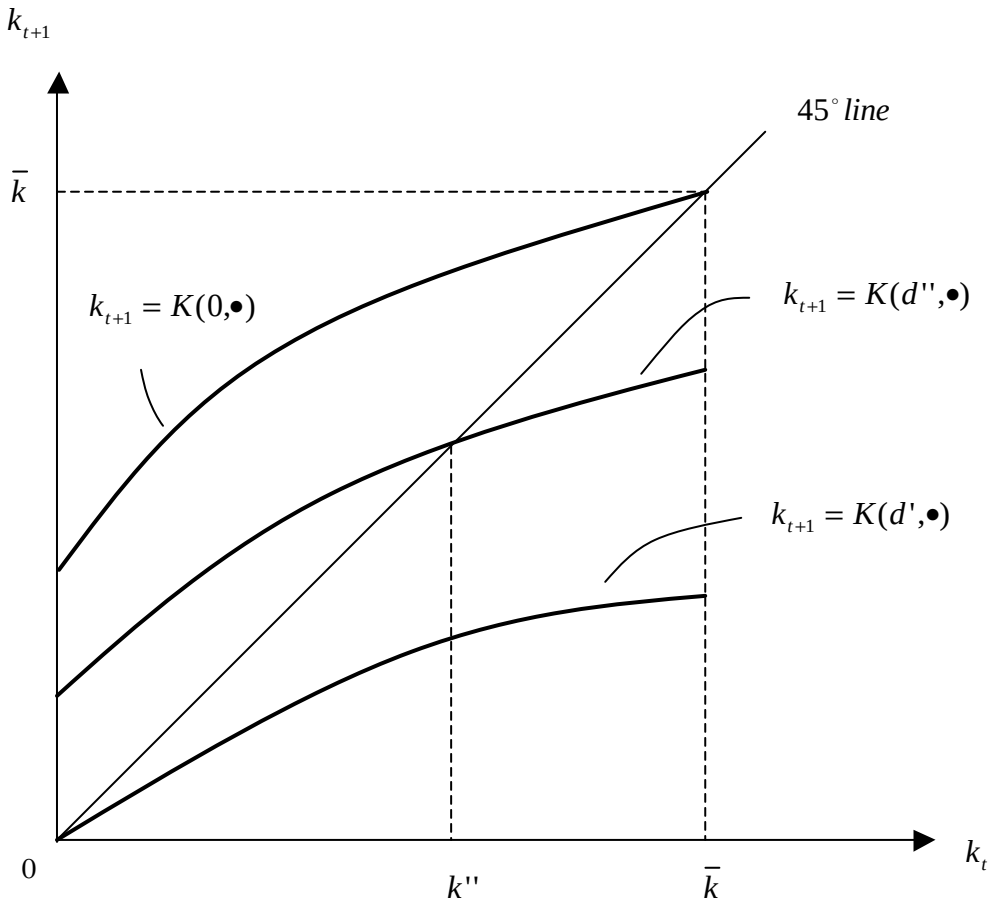

Figure 2. The Law of Motion for the Morale