

CIRJE-F-276

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Credit Market Imperfection**

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May 2004

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Cost of Enforcement in Developing Countries with Credit Market Imperfection

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First draft: December 2002

This version: April 2004

Abstract

This paper examines development processes of a country when the degree of verifiability is endogenously determined. We characterize the development processes rigorously and show that although the efforts for improving of verifiability are important, the income distribution of a country is crucial for the effectiveness of efforts to the development processes. Moreover, this paper explains the situation where one country shows high growth rates temporally even if the technology of enforcement is poor, but eventually it experiences economic collapses.

JEL classification numbers: E44, F43, O11.

Keywords: Credit market imperfection, quality of contract enforcement, degree of verifiability, legal institution.

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1 Introduction

This paper examines development processes of a country when the enforcement of contracts is imperfect and the degree of imperfection is endogenously determined. We consider the situation where the country has to hire some workers in order to improve the quality of contract enforcement. Thus improving the quality of contract enforcement involves some costs. This paper examines the dynamics of an economy when the enforcement is costly and the improving of enforcement requires some labor forces.

Recently, many studies have focused on the importance of contract enforcement. These papers have pointed out that the quality of contract enforcement has a significant effect on the macroeconomic performances and the development process. For example, La Porta et al. (2000) has examined the relation between the legal system and the financial performance. Kiyotaki and Moore (1997), and Matsuyama (2004) derived the macroeconomic dynamics when the enforcement of contracts is imperfect and the degree of imperfection is exogenously given. From the results of those papers, one may derive the following policy implication. “An improvement of the quality of contract enforcement is an important factor for the economic development. In order to enhance the productive activities, therefore, it is better to promote the policies that improve the quality of contract enforcement.”

In the above statement, however, the cost side of enforcement has been ignored. The net benefit of improving the contract enforcement is unclear when we consider the cost side of improvement. Hence, we ask the following questions: How the cost of enforcement affects the investment decision and the size of enforcement sector? What determines the macroeconomic performance and the dynamic path of this economy? Is it better to promote the enforcement activities by policy interventions? These questions are quite important unsolved problems for developing countries. In this paper, we examine these problems by using a simple macro dynamic model.

In order to improve the quality of contract enforcement, there are at least two remarkable mechanisms.¹ One mechanism is the legal enforcement as stressed by La Porta et al. (2000). Making better legal rules and increasing the quality of courts are important factors for improving the quality of legal enforcement. To realize the purpose, sufficient number of policemen, judges and bureaucrats (we call them “enforcers”) should be employed. In order to hire those workers engaging the improvement of the enforceability, however, the government has to pay the wage for those workers. Moreover, since they do not engage in productive activities directly, raising the share of them would decrease the total production level in this economy.² Thus these

¹Dixit (2003) compared the community enforcement under a long term relationship and the third party enforcement with setup cost.

²In our setting, the investment for the enforcement sector involves a reduction of the

“costs” should be considered when the government increases the number of workers in the enforcement sector and improves the quality of enforcement.

Another mechanism is the community enforcement. Usually the community enforcement mechanism is implicit and uses the idea of the repeated game structure. Repeated interactions in a community create the social capital and it may enhance the enforcement of contracts.

This paper considers the former type of contract enforcement. However, our argument would be possible to more general mechanisms including the later one. Our results can be extended to the case, for example, entrepreneurs in a country by themselves construct sufficient size of enforcement sector and they share the cost of enforcement.

Under the situation where the labor force is necessary for increasing the size and quality of enforcement sector, we can derive several important implications. First, how many workers should be allocated to the enforcement sector is a crucial factor for economic development.

Second, the income distribution of this country becomes important for realizing the high quality of contract enforcement, because the wage rate for the enforcers affects directly to the cost of enforcement. If the outside opportunity for these enforcers is high, wages for the enforcers becomes a burden for this economy. This means that the cost of enforcement becomes relatively high and in some cases it is too costly for hiring the enforcers and improving the quality of enforcement. Actually in this paper we will show that in some cases, it is too costly for improving the quality of enforcement and the country cannot utilize productive investment opportunities. Thus the relative wage rate of the enforcers or income distribution in the country is important for the size and quality of enforcement sector and the development process.

Third, the sharing rule of the enforcement cost is another important factor for improving the quality of enforcement. If we think about the formal legal system, it is natural to assume that the cost for hiring judges or policemen is shared by all people in this country. If we look at more implicit enforcement mechanism or more private enforcement mechanism, the cost of enforcement is paid by more directly related persons or the ones who get the benefit from the enforcement sector directly. It is not so obvious who should pay the cost for enforcing the contracts. In this paper, we examine this point carefully and show that in some cases sharing the cost by all people would

number of productive labor. Murphy, Shleifer, and Vishny (1991) described the losses from poaching high-ability labor from a productive sector to a rent seeking sector. In their model, even if rent seeking sector may enhance efficiency, an increase in the rent seeking sector reduces technological improvement in the production sectors. Therefore, they concluded that an increase in the rent seeking sector may be harmful to developing. In the present paper, contrary to their model, it is indispensable for borrowing from the credit market to invest the labor force for the enforcement sector. Acemoglu and Verdier (2000) considered choice between market failure and bureaucrats’ corruption. They used a type of the efficiency wage model in a static environment.

be better for realizing economic development.

Furthermore, this paper shows the condition where the development process collapses. Krugman and Obstfeld (2003) said that “one important weakness of Asian economies only became apparent after they stumbled: the lack of a good legal framework for dealing with companies in trouble.”³ It is natural to consider that the recent experience of Asian countries revealed the importance of legal systems. However, it is still unclear why in 1990s those countries have shown very good performances even if the legal framework of those countries is poor. Hence we should present more convincing and the consistent explanations about the Asian experience. This paper tries to show such an explanation. We explain that, even if the technology of enforcement is poor, one country can show high growth rates temporally, but eventually it experiences economic collapses.

The rest of this paper proceeds as follows. Section 2 describes the environment of our model. Section 3 shows the dynamics of this economy when the government charges the cost for enforcement to the entrepreneurs. Section 4 investigates the situations where this economy faces an underdevelopment trap. Section 5 considers the reallocation of enforcement cost not only to the direct users to escape from underdevelopment traps. Section 6 shows the possibility of collapse in a development path. Section 7 presents some extensions.

2 Model

We consider a small open economy model where overlapping generations of two-period lived agents exist. The periods are indexed by t ($t = 0, 1, \dots$). We call entrants at period t the generation t . Each generation consists of a unit mass of homogeneous agents. Each agent has one unit of labor only at young and she inelastically supplies it. Thus the maximum total labor supply in each period is equal to one, and the wage rate is w_t .

The wage income will be used for the consumption at young or the investment to consume at old. For the investment, each agent has two options, lending her money at a competitive international credit market (we call “lending”) or becoming an entrepreneur (we call “investing”). At the international credit market, a time invariant and exogenously given gross return is $r > 1$. If an agent lends her entire wealth to the credit market at the end of young, therefore, her second-period consumption becomes $w_t r$. On the other hand, she can invest her wage to become an entrepreneur at the end of young. One key assumption is that this investment must be one unit, hence she must borrow $1 - w_t$, if w_t is less than one. For simplicity, we assume that the utility function of each agent is additive separable with respect to consumptions in both young and old periods and without discounting. Thus

³See Krugman and Obstfeld (2003), page 690.

each agent is not willing to consume during the young period and use the wage only for lending or investing since r is greater than one. Moreover, we assume the initial endowment of the generation zero is exogenously given as $1 > w_0 \geq 0$.

In order to simplify the production and the wage determination processes, we assume the following simple production technology. To produce $R(> 0)$ units of consumption good, each entrepreneur who has one unit of capital requires one unit of labor. For simplicity, we assume here that the return R is divided by an exogenously given sharing rule, that is, an entrepreneur gets sR and a worker gets $(1 - s)R$. Furthermore we exclude the possibility that foreign investors become entrepreneurs of this country.

If the return of the investment sR is too low, an agent always chooses the lending and the problem we are considering becomes trivial. Thus we assume that $sR \geq r$.

Assumption 1. $sR \geq r$.

Moreover, if the wage rate is sufficiently high, an agent needs not borrow any amount to become an entrepreneur. Hence it is natural to assume $(1 - s)R < 1$. The left hand side of this inequality is the wage income for a worker and the right hand side is required amount for the investment.

Assumption 2. $(1 - s)R < 1$.

Since we assume that the gross return from the investing is larger than gross interest rate, $sR \geq r$, an agent is willing and able to become an entrepreneur if the degree of verifiability is perfect. That is, if the degree of verifiability is perfect, an agent can borrow necessary amount regardless of her initial wealth, w_t . In this paper, however, we assume that not all of the gain sR is verifiable. In other words, this investment opportunity faces an unverifiability problem, and so the lenders in the international credit market cannot expect to get all of sR as the source of repayment for lending to those entrepreneurs. This unverifiability may come from the imperfection of enforcement activities or may come from the incompleteness of legal rules. Actually, many developing countries have the limitation of enforcement of contracts, and we are trying to formulate this situation.

We denote the degree of verifiability of these investment contracts at period $t+1$ by $\lambda_{t+1} \in [0, 1]$. Thus the international lenders at period t expect only $\lambda_{t+1}sR$ as the maximum source of repayment. Even though contracts promise to repay more than $\lambda_{t+1}sR$, those contracts are meaningless since entrepreneurs choose strategic defaults and try to decrease the repayment.⁴

⁴A natural interpretation of λ_{t+1} is as follows. The enforcement sector in the borrower's country can capture and repay to the lender a fraction λ_{t+1} of the borrower's profit if strategic default occurs. Another interpretation is that the fraction λ_{t+1} of the borrower's profit is perished in the process of strategic default.

Since the lenders are able to expect this problem, they would allow the entrepreneur to borrow only up to $\lambda_{t+1}sR/r$ at period t .

The determinants of the quality of enforcement are the key to our analysis. This paper focuses on the number of enforcers for determining the quality of enforcement. More precisely, in order to improve the enforcement activities, the government has to hire sufficient number of workers to examine contracts and agents' activities. We call those workers "enforcers." Those enforcers may include judges, prosecutors, and inspectors and so on. Moreover, bureaucrats may be included to the enforcers since they affect the quality of verifiability by providing legal rules or government regulations. Hence we assume here that λ_{t+1} is a function of the ratio of the number of enforcers to entrepreneurs, x_{t+1}/n_{t+1} , where x_{t+1} is the number of contract enforcers and n_{t+1} is the number of entrepreneurs at period $t+1$, and assume $\lambda'(x_{t+1}/n_{t+1}) > 0$ and $\lambda''(x_{t+1}/n_{t+1}) \leq 0$.

Since the government hires the enforcers for improving the verifiability of contracts, those enforcers cannot engage in the production process. It means that this economy has to pay two types of costs in order to increase the quality of enforcement. First, some of workers have to engage in the enforcement activity and the enforcement activity does not contribute to the GDP at all, thus those engagements are costly for this economy. Second, in order to hire the workers engaging the enforcement activities, this economy has to pay the wage costs for those workers. Hence one important issue is who pay the wage costs.

One convincing rule is that the cost is borne by the direct user of the enforcement sector. This means that the wage cost for hiring enforcers is paid by the entrepreneurs through, for example, capital income tax. Another possible rule is that the cost is borne by all members of the economy thorough, for example, consumption tax. In the following analysis, we classify the bearing rules of wage costs and study each of them. We assume here that, to use the enforcement sector, the contract enforcers must be employed in each period, that is, the cost of enforcement has to be paid in each period. In a later section, we discuss the case in which the effort of enforcers can be accumulated to the future periods.

Since each entrepreneur requires one worker to produce R units of final goods, the number of enforcers limits the number of entrepreneurs, that is $n_{t+1} \leq 1 - x_{t+1}$. Furthermore we have assumed that all agents are symmetric and every young worker faces the same incentive constraints. Thus, $n_{t+1} = 1 - x_{t+1}$ as long as $n_{t+1} > 0$ and it means $\lambda_{t+1}(x_{t+1}/n_{t+1}) = \lambda(x_{t+1}/(1 - x_{t+1}))$. For simplicity, we assume that $\lambda(x_{t+1}/(1 - x_{t+1}))$ is the linear function of x_{t+1} , that is $\lambda(x_{t+1}/(1 - x_{t+1})) = ax_{t+1}$, where x_{t+1} is the size of enforcement sector and $a > 0$ is an exogenously given parameter that represents the enforcement technology.

Each young worker decides to work in the production sector or to become an enforcer at the beginning of each period. Because no one can compel the

young generation to become the enforcer, the wage for enforcers has to be the same or larger than the market wage rate. On the other hand, the government has no incentive to pay too high wage to the enforcers, thus the wage for the enforcers and that for production workers are the same, w_t . At the end of period t , each agent of the generation t gets the wage w_t and determines the investment choice.

We assume that the objective function of the government is to minimize the enforcement sector x_{t+1} under the constraint to sustain the investment. Since the enforcement sector does not contribute the production directly, this must be a natural assumption. At the end of period t , the government announces the number of enforcer at period $t + 1$, x_{t+1} , which determines the degree of verifiability. Given the verifiability level ax_{t+1} , the lenders in the international market decide the possible lending amount. In order to become an entrepreneur, there must be sufficient verifiability of contracts at period $t + 1$ for borrowing the amount $1 - w_t$. Thus if the enforcement level is too low, the possible lending amount becomes too low compared to $1 - w_t$, and the investment cannot be realized. This means the required size of enforcement sector at period $t + 1$ is a function of w_t .

3 The Direct Allocation Rule

In this section, we study the case where the government charges the cost for enforcement to entrepreneurs. Hereafter we call this “the direct allocation rule.” This would be one natural situation since entrepreneurs directly get the benefit of the enforcement activity. Under the situation, we will show that high degree of verifiability is better for increasing the verifiable profit for entrepreneurs, but it also increases the cost for them.

First we check the incentive of agents to become entrepreneurs. Since she can get rw_t by lending her wage to the international market, the return of becoming entrepreneurs must be higher than (or equal to) this. For getting sufficient enforcement, however, the government has to hire sufficient number of enforcers and entrepreneurs must pay for them. Thus the return for entrepreneurs might be reduced too much and be lower than rw_t , if the enforcement sector becomes too large. To consider this possibility rigorously, let us consider the decision of an agent of the generation t . Suppose that there are n_{t+1} entrepreneurs and the number of enforcers is x_{t+1} at period $t + 1$. In this situation, each entrepreneur (which are supposed to be symmetric) has to bear the enforcement cost $w_{t+1}x_{t+1}/n_{t+1}$. Therefore, the net return for an entrepreneur is $sR - w_{t+1}x_{t+1}/n_{t+1} - r(1 - w_t)$, where $r(1 - w_t)$ is the repayment to the lender at period $t + 1$. If this net return is larger than rw_t , an agent is willing to become an entrepreneur. Since $w_{t+1} = (1 - s)R$, the following condition should be satisfied when n_{t+1} agents decided to become entrepreneurs and the government decided to hire x_{t+1} enforcers.

$$sR - \frac{(1-s)Rx_{t+1}}{n_{t+1}} \geq r. \quad (1)$$

As we have shown in the previous section, $n_{t+1} = 1 - x_{t+1}$ holds as long as $n_{t+1} > 0$. Thus (1) can be rewritten as follows:

$$\frac{(s - x_{t+1})R}{1 - x_{t+1}} \geq r. \quad (2)$$

The left hand side of this inequality is the return of investment including the cost of enforcement. We shall call the above inequality *the profitability condition*. This condition specifies the upper bound of x_{t+1} which satisfy the profitability of the investment. From (2), the upper bound of x_{t+1} is $\bar{x}_{t+1} = (sR - r)/(R - r)$.

Next we check the incentive of international lenders. As we explained before, the lenders cannot seize the all return of entrepreneurs since there is an enforcement problem. If the enforcement level is too low, lenders do not invest sufficient amount for starting the production in this country. Thus the following condition must be satisfied.

$$ax_{t+1}sR - \frac{(1-s)Rx_{t+1}}{1 - x_{t+1}} \geq r(1 - w_t). \quad (3)$$

The right hand side of (3) is the necessary repayment level to international lenders, since the wage rate at period t is w_t , and an agent of generation t becoming an entrepreneur has to borrow $1 - w_t$. International lenders, however, invest this amount only the case where they can expect to get more than or equal to $r(1 - w_t)$. The left hand side represents the possible amount of repayment. An entrepreneur can get sR . However the enforcement sector captures only $ax_{t+1}sR$ as the verifiable amount of output and then the wage for enforcers should be paid from the captured output. Because the amount of the enforcement cost per entrepreneur is $(1-s)Rx_{t+1}/(1-x_{t+1})$, the left hand side of (3) represents the possible amount of repayment per an entrepreneur. We shall call this inequality *the borrowing condition*.

As you can easily see, those two conditions depend on the number of enforcers, x_{t+1} . Therefore we can describe the feasible set of x_{t+1} that satisfies those two conditions. Since hiring the enforcers is costly, it is natural to assume that the government chooses the minimum x_{t+1} which satisfies these two conditions.

At $t = 0$, the borrowing condition is

$$ax_1sR - \frac{(1-s)Rx_1}{1 - x_1} \geq r(1 - w_0). \quad (4)$$

Since w_0 is exogenous in this model, at $t = 0$, the government has to choose x_1 given w_0 to satisfy the above condition. In addition, such x_1 has to satisfy the profitability condition. There may not exist x_1 which satisfies the above conditions. In this case, this economy is unable to realize the profitable investments. We will examine this possibility in the next section more carefully.

As long as the borrowing and the profitability conditions are satisfied at period $t \geq 1$, the minimum x satisfying the conditions is derived by the following equation.

$$asRx_{t+1} = \frac{(1-s)Rx_{t+1}}{1-x_{t+1}} + r(1-(1-s)R). \quad (5)$$

From this equation, we can easily see that the optimal size of enforcement sector x_t^* becomes time invariant at period $t \geq 2$. That is, the economy immediately goes to the steady state at $t = 2$ and $x_2^* = x_3^* = \dots = x^*$. Since the total production level of this country is $(1-x_t)R$, the size of enforcement sector x_t determines the total production level in this economy.

To sum up, we obtain the following.

Proposition 1. *Under the direct allocation rule, if there exists x which satisfies both*

$$axsR - \frac{(1-s)Rx}{1-x} \geq r(1 - \min\{w_0, (1-s)R\}), \quad (6)$$

and $x \geq (sR - r)/(R - r)$, the production level of this economy goes to the steady state $(1 - x^)R$ at $t = 2$, where x^* is the minimum of x that satisfies $axsR - (1-s)Rx/(1-x) \geq r(1 - (1-s)R)$, and $x \geq (sR - r)/(R - r)$.*

From this result, we can see that x^* is a decreasing function of R and an increasing function of r . The intuitive explanation of this result is simple. If the investment opportunity of this country is very productive, the international credit market is willing to lend the money even though the degree of enforcement is low. Hence this country needs not raise the verifiability by decreasing the productive labor supply.

4 Underdevelopment Trap

The above analysis has concentrated to the cases where we can find feasible x satisfying both the profitability condition and the borrowing condition under the direct allocation rule. There is a possibility, however, that the government cannot find such x . This possibility is important to consider the underdevelopment problems of less developed countries.

First, we consider the situations where the borrowing condition is never satisfied even if the government employs many enforcers.

Proposition 2. *Under the direct allocation rule, if $a < (1 - s)/s$, this economy cannot find x_{t+1} which satisfies the borrowing condition.*

Proof. For any positive x_{t+1} , the left hand side of the inequality (3) is negative if $a < (1 - s)/s$. On the other hand, the right hand side of (3) is strictly positive. Therefore, the inequality never holds if $a < (1 - s)/s$. ■

Proposition 2 means that if the enforcement technology a is too low, it is difficult to establish high enforcement society even if the government has decided to hire many enforcers. One interesting point is this threshold level of a , $(1 - s)/s$, is dependent upon the parameter of income distribution s . By rearranging the above condition, we get $s < 1/(a + 1)$. This means that, when s is sufficiently small for a given quality of the enforcement technology a , it is difficult to raise the verifiability and realize the investment opportunity. The intuitive reason of this situation is as follows. The cost and benefit of the enforcement is related to the income distribution, since the cost of enforcement depends on the wage of enforcers. Thus the cost of enforcement is related to the income distribution of R . If the wage rate $(1 - s)R$ is too high, an increase in the size of enforcement sector is too costly compared to the gain from the increase of verifiability.

This point has an important implication for economic development problems. It is now well known that an increase in quality of enforcements or legal system is an important factor and many countries try to improve the quality of enforcement. However, it is not well recognized the cost side of the improvement of enforcement. It becomes very costly if so many workers are needed and the wage rate of those workers is too high for the verifiability. Hence the wage structure or income distribution is an important factor for the improving verifiability and economic developments. This point may explain a reason why some less developed countries fail to take-off even though they try to improve the quality of enforcement.

Next, we show that even though the inequality $a < (1 - s)/s$ is not satisfied, there may not be x_{t+1} satisfying the borrowing condition (3). When $a > (1 - s)/s$, the left hand side of (3) is increasing at $x_{t+1} = 0$ and is a concave function of x_{t+1} . Consequently, by increasing in a , the left hand side becomes larger for any positive x_{t+1} . The left hand side is maximized at

$$x_{t+1} = \frac{as - \sqrt{as - as^2}}{as}.$$

Because the right hand side of (3) is a positive constant, whether there exist some x_{t+1} that satisfy the equation (3) is dependent on the value of a , and we get the following proposition.

Proposition 3. *Under the direct allocation rule, for the generations $t(\geq 1)$, there exist a threshold $a^{\min}(> (1 - s)/s)$ such that, for any $a < a^{\min}$, the government cannot find x_{t+1} which satisfies the borrowing condition.*

Proof. The left hand side of borrowing condition (3) is maximized at $(as - \sqrt{as - as^2})/as$ and the maximum is strictly positive if $a > (1 - s)/s$. Moreover, if a is multiplied by a positive number, the maximum is also multiplied by the same magnitude. Since the right hand side of borrowing condition is a positive constant, there exists an a^{min} such that the borrowing condition holds for any $a \geq a^{min}$ and does not hold for any $a < a^{min}$. ■

In the cases where there is no x_{t+1} satisfying the borrowing condition, the government cannot show the credibility of enforcement and the young generation cannot borrow sufficient money to become the entrepreneurs. That means this economy cannot realize the production project even though it is profitable compared to lending for the international credit market. The reason of this underinvestment result, of course, comes from the unverifiability or the imperfect enforcement problem. Since it is too costly to increase the verifiability, this economy cannot borrow sufficient money from the market.

Although we have concentrated to examine the borrowing condition, we should care even about the profitability condition for determining the optimal x rigorously. Even if this economy satisfies the borrowing condition, it may not satisfy the profitability condition. As we have derived in Section 3, the profitability condition requires the upper bound of x_{t+1} , $\bar{x}_{t+1} = (sR - r)/(R - r)$. Thus even if the economy can derive the minimum x satisfying the borrowing condition, it goes to the underdevelopment trap when this minimum x is larger than \bar{x}_{t+1} .

These could be reasons of underdevelopment in less developed countries. Since the enforcement is too costly, this economy cannot realize the high verifiability and cannot make use of the investment opportunity. One important point of this result is that the income distribution is crucial for the feasibility of enforcement and economic development. In the next section, we consider another sharing rule of enforcement cost and the re-distribution policy.

5 Reallocation of Enforcement Cost

In the previous sections, we have assumed that the government allocates the cost for enforcement only to the entrepreneurs. The contract enforcement is, however, usually treated as a public service and it might be natural to assume that the government allocates the cost not only to the direct users. For considering this point, we assume in this section that young workers pay all of the enforcement costs. We call this “the reallocation rule.” Of course, this situation is an extreme one, but we can find general property of reallocation policies by this examination. The main purpose of this examination is to study whether or not the country can escape from underdevelopment traps by the reallocation of the enforcement costs.

Let us now start to derive the profitability condition and the borrowing condition under the present cost reallocation rule. In this case, the profitability condition is obvious. Since entrepreneurs do not have to pay the enforcement cost, the return of investment does not include it. Hence the profitability condition becomes $sR \geq r$ and it is always satisfied under Assumption 1.

On the other hand, the borrowing condition for the generation t under the present cost allocation rule is

$$ax_{t+1}sR \geq r(1 - w_t). \quad (7)$$

The left hand side is the expected profit which the international lenders can seize, and the right hand side is the necessary amount of repayment from an entrepreneur to the investors. We should be careful that w_t is different from $(1 - s)R$ in this case because workers have to pay the enforcement cost. Since there are x_t enforcers at period t , $(1 - x_t)$ young workers have to share the enforcement cost $x_t w_t$. Hence w_t has to satisfy the following condition,

$$w_t = (1 - s)R - x_t w_t / (1 - x_t),$$

and we get the following equilibrium (after the tax or net) wage rate,

$$w_t = (1 - x_t)(1 - s)R. \quad (8)$$

Thus by arranging the borrowing condition (7) with (8), we get

$$ax_{t+1}sR \geq r(1 - (1 - s)R) + r(1 - s)Rx_t. \quad (9)$$

One important point of the condition (9) is that the right hand side is independent of x_{t+1} . Since the entrepreneurs of generation t do not have to pay the enforcement cost at $t + 1$, the amount of borrowing does not depend on the current enforcement level, x_{t+1} . On the other hand, the left hand side is an increasing function of x_{t+1} since an increase of the enforcement level is better for the international lenders. Thus by increasing of x_{t+1} , it becomes easier to satisfy the condition (9), the borrowing condition for given w_t . This situation is very different from that in the previous section.

In the case of previous section, the entrepreneurs have to pay the current enforcement cost, so that increasing in the size of the enforcement sector reduces the net profit of the investment for each entrepreneur. Hence it is not always better for the entrepreneurs to increase the enforcement level x_{t+1} . However, in the case of this section, the entrepreneurs do not have to pay the enforcement costs, so that the net profit of the investment for each entrepreneur does not change even if the enforcement level x_{t+1} has increased. An increase in the enforcement level simply raises the expected return of international investors. Hence it becomes easier to find out x_{t+1} which satisfies the borrowing condition for given w_t .

As we have shown, both the profitability condition and the borrowing condition are easier to satisfy for given w_t under the allocation rule considered in this section. Therefore, we obtain the following.

Proposition 4. *Given w_t , the generation t becomes easier to start the investment project at the period $t + 1$ if the enforcement cost is reallocated to the young workers.*

Thus by shifting the enforcement cost, this economy may implement the profitable investment which is not realized when the entrepreneurs have to pay the cost.

We should be careful, however, that the reallocation of the enforcement cost to the young workers is not “a free lunch” for this economy. Since young workers have to pay the enforcement cost, their initial fund for becoming entrepreneurs is decreased by the reallocation. Consequently, they have to borrow more to become entrepreneurs and the government has to raise x to satisfy the borrowing condition for them. Hence the next question we should consider is whether x_{t+1} satisfying the borrowing condition can converge to the steady state with positive production or not.

From the inequality (9), we can find the following proposition.

Proposition 5. *Under the reallocation rule, there exist a steady state with positive production if and only if $s > r/(aR)$. The steady state x^{**} is*

$$x^{**} = \frac{r(1 - (1 - s)R)}{R(as - r(1 - s))}.$$

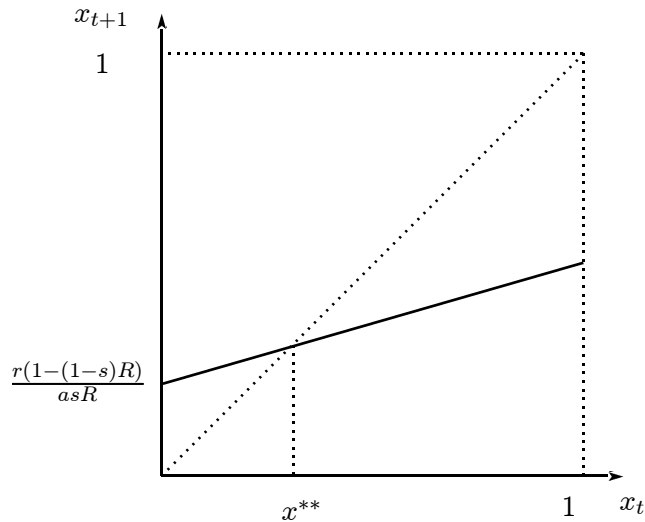


Figure 1:

Figure 1 explains this situation. Since the government chooses the minimum x_{t+1} under the constraint of inequality (9), the following equation should be satisfied.

$$x_{t+1} = \frac{r(1 - (1 - s)R)}{asR} + \frac{r(1 - s)R}{asR}x_t. \quad (10)$$

In order to have the steady state ($x_t = x_{t+1}$), the right hand side of the equation (10) is less than one at $x_t = 1$. This is equivalent to the condition, $s > r/(aR)$.

From this condition, we can understand that the income distribution parameter s is important even in this case. Sufficiently high s is necessary for continuing the investment. An intuitive explanation is as follows. If s is sufficiently high, the wage rate for the enforcers becomes low and the cost for enforcement does not become so large. This means that the negative impact for raising x_{t+1} , the decrease of the young workers' gain, becomes not so high and the borrowing condition can be satisfied by raising of x_{t+1} .

In this allocation rule, for any w_0 , the investment is implemented at every period and the total production level converges to $(1 - x^{**})R$ as long as $s > r/(aR)$. This situation is very different from the situation under the direct allocation rule. In the situation described in Section 3, the initial condition w_0 is important. If w_0 is too small, the initial investment is not realized and this economy cannot realize the investment at every period. In the situation where young workers pay the enforcement cost (i.e., under the reallocation rule), the initial level of wealth, w_0 , is irrelevant and investments are realized at every period as long as $s > r/(aR)$.

By combining the conditions of Propositions 2 and 5, we get the following proposition.

Proposition 6. *If $r/(aR) < s \leq 1/(a + 1)$, the direct allocation rule does not realize the investment in the steady state. However, it becomes possible to sustain the investments in every period by sifting the enforcement cost from the entrepreneurs to the young workers.*

Next we compare x^* and x^{**} . If the steady state with positive production exists under both of the two different allocation rules, is x^{**} smaller than x^* ? Although the general comparison between x^* and x^{**} is complicated, we can get the following result.

Proposition 7. *Even though x^* and x^{**} exists, if $x^* > (r - 1)/r$, x^{**} is smaller than x^* .*

Proof. Let define $L^D(x) = (1 - s)Rx/(1 - x) + r(1 - (1 - s)R)$, and $L^R(x) = r(1 - s)Rx + r(1 - (1 - s)R)$. Since $L^D(x) = L^R(x)$ at $x = (r - 1)/r$ and $L^{D''} > 0$, $L^D(x^*) > L^R(x^*)$ if $x^* > (r - 1)/r$. This means, if $x^* > (r - 1)/r$, $asRx^* = L^D(x^*) > L^R(x^*)$ and thus $x^{**} < x^*$. ■

This means that, when x^* is sufficiently large, it is better to allocate the enforcement cost to the young workers even if there exists the steady state with positive production under the direct allocation rule.

6 Collapse of Development

In the previous section, we have examined the situations in which the cost of enforcement is borne by the young workers and the borrowing condition can be satisfied by increasing in the size of enforcement sector. In some cases, however, the borrowing condition may not be satisfied in the long run. As we have examined in the previous section, this economy reaches the steady state with positive production as long as $s \geq r/(aR)$ under the reallocation rule. In this section, we examine the dynamics under the situation where $s < r/(aR)$.

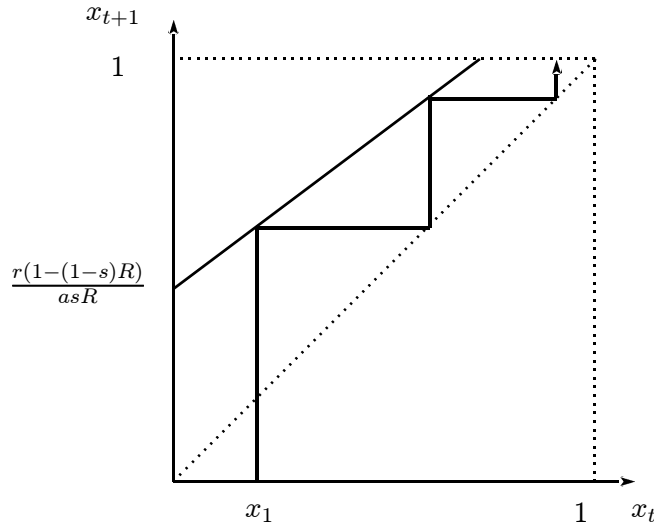


Figure 2:

As Figure 2 shows, if $s < r/(aR)$, the economy does not converge to a steady state with positive production. One interesting aspect in this case is that it shows the possibility of “development collapse.” This economy can realize the investments for a while, however, eventually it cannot satisfy the borrowing condition and the investment should be stopped. This means that the economy experiences a sudden decline of GDP, in other words, this country experiences “sudden collapse.”

Under the direct allocation rule, it is impossible to realize the investments if $s < 1/(a + 1)$. By changing the allocation rule to the reallocation rule, the government can realize the investment. In this sense, the change of the allocation rule is a good strategy for the government, since this economy can

escape from the underinvestment trap. If $s \leq r/(aR)$, however, the economy gradually requires larger size of enforcement sector to sustain the borrowing condition as Figure 2 shows, and finally it experiences the collapse. Hence the changing of the allocation rule about the enforcement cost is not a perfect solution to escape from the underdevelopment trap. In order to sustain the investment, this country has to raise the income distribution parameter, s , to $r/(aR)$ or has to raise a .

This phenomenon could explain the recent experience of Asian countries. As we have explained in the introduction, Asian countries experienced high economic growth and sudden economic crisis. The lack of a good legal framework for dealing with companies is one reason of the trouble, and it is sometimes claimed that the recent experience of Asian countries revealed the importance of legal systems. However, it has been still unclear why in 1990s those countries have shown very good performances if the legal framework of those countries is poor. The dynamics of the above situation may become one answer to the puzzle. Here we have shown that even if the technology of enforcement a is poor, $s \leq r/(aR)$, one country can implement the investment by using the reallocation rule. Such development path, however, cannot be sustained as shown in Figure 2. The cost of enforcement gradually expands and finally it becomes impossible to sustain the growth path. This could be consistent with the economic crisis in Asian countries. This result shows that the legal framework for enforcement is important for economic growth in the long run. Even if an economy can sustain an economic growth path for a while, that may not guarantee the long run stable economic growth. Developing countries may have to establish a good legal framework.

For that purpose, however, a country has to pay the cost for setting up the better legal framework. This paper has shown that the income distribution is an important parameter to realize the good legal framework and economic growth.

7 Concluding Remarks

This paper studied an economy with an imperfect enforcement problem. By endogenizing the cost of improving the quality of contract enforcement, we have derived several implications. The main result is that the income redistribution policies and the enforcement policies are not independent for the government. Even if the policies for improving the quality of contract enforcement are the same, the dynamic path or the development process of one country may become different from another country if their income distribution or income redistribution policies are different. Thus when we look at the policies for enforcement, we should be careful with the optimal combination of income distribution policies and the enforcement policies.

To conclude the paper, we describe three remarks in order. First, in this paper we have assumed for simplicity that the allocation of profit is determined by a given parameter s and we did not consider the possibility that the profit allocation rule is affected by the market conditions. For example, if there are so many workers compared to the entrepreneurs, it might be natural to assume that s should be increased. Even if we extend our model to such general situations, however, our qualitative results do not change. Even in those extended situations, the income distribution parameter is important for the determination of the size and quality of enforcement sector and the entrepreneurs' investment decision. If s depends on the size of enforcement sector x (or the number of young workers $1 - x$), however, the dynamic path may show some cycles. This is a new aspect of results, when we extend our simple framework to more general situations.

Second, the possibility of corruption in enforcement process is ignored in this paper. However, this is an important issue in the situation where the enforcement sector has the competence of enforcement. If the government employs the efficiency wage for the enforcers (or bureaucrats) for solving the corruption problem as studied in Acemoglu and Verdier (2001), the cost of enforcement increases and therefore the implementation of borrowing is more difficult than that in the no-corruption situation.

Last, we have assumed that the devoted effort by the enforcers is not accumulated in this model. However, if we treat these efforts as the effort for making optimal legal rules, these rules would be effective even in the future and we should treat they are accumulated. It is not so difficult to extend our model to such general situations. For example we may be possible to assume the technology of contract enforcement a is affected by the previous size of enforcement sector x . In such situation it might be better to devote more labor forces at the beginning of this economy and raise the future a to sustain a growth path. Rigorous examinations about these possibilities would be interesting future researches.

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