

## PUBLIC CONTRACTING AND CORRUPTION: A MICROECONOMIC ANALYSIS OF MANAGERIAL BEHAVIOR

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### Abstract

In this work, a first microeconomic approach is developed concerning the role firms play in the public contracting process and the problem of managerial corruption in this context. We thus outline a first analysis of the choices taken by firms when contracting with the public administration, considering the existence of both legal and corrupt contracts and the substitutability or not of both. We then show a financial model justifying the choice of a contract portfolio based on the uncertainty and risk involved. The conclusions allow us to both offer some performance directives in order to control the phenomenon of corruption, and to understand the persistence of corrupt contracts.

**Keywords:** public contracts, managerial behavior, bribes, microeconomic

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### Introduction

According to Robertson and y Watson (2004), corruption is one of the country-level influences on market entry, investment and other decisions fundamental to strategic management at the international level. Furthermore, the use of bribes or not in a contracting process is a strategic decision that the firm and especially the management must take into account.

Much has been said about the corruption phenomenon and public contracts; however, we still do not know what role a firm plays when a contract is made with the government and a corruption process develops in this managerial context. Public contracts make up a very significant part of the Gross National Product generated by each country. For that reason, it can be supposed that the firms belonging to a certain industry have an important desire to compete for the awarding of projects offered by the government. Thus, competition for public contracts is considered, in principle, as a mechanism that reinforces competitiveness in the market among the firms of an industry, both bidders and non-bidders<sup>2</sup>.

When a contract is made, there are potential conflicts of interest among the agents engaged in the

contractual relationship. As occurs in the private context, in this public context the origin of the problem can also be located in the differences of interests among the parties. Once a deal has been reached and the partners commit to a relationship, each one trusts the other, although with some reservations, assuming the probability that the other will not respond in the expected way either because he may act dishonestly or because he can only commit to the contract in a limited way.

If we pose this possibility in which contract performance is questioned, we can move ahead a step in the research process by thinking about the topic of corruption and the firm. Thus, in this research paper we develop a first approach about the role that firms play in the process of public contracting from a microeconomic perspective, and we analyze the existence of both corrupt and legal deals<sup>3</sup>. Also, we will try to understand why managerial corruption is justified on many occasions in this context.

We therefore show a first analysis in which the firm's choices when bidding for a public procurement are explained considering both legal and corrupt contracts and the perfect substitution or not between them. It is thus a first approach to how we can get closer to (desirable) legal contracting by modifying

<sup>2</sup> Competition in public contracts awarding is a necessary condition for allowing economics operators to enter the public sector. Thanks to competition, a minimum level of efficiency in contracting can be achieved.

<sup>3</sup> Hereinafter, in order to simplify the argument, when we say corrupt contracts (deals) we are referring to an illicit agreement in which a bribe has been paid.

the choices of the individuals. In a second step, taking into account the risk of breach of contract, we include in our analyses the profitability-risk binomial and analyze contract portfolios and the choice of different contract types as a function of the uncertainty and the risk they entail. This allows us to justify the persistence problem in the enforceability of corrupt contracts.

In order to develop this work, we subsequently study the characteristics of legal contracts and corrupt deals and we explain why some voices justify managerial corruption in this context. In the third section we discuss the reason for corrupt contracts, which leads us to a cost-profit analysis of the problem. Next, the analysis of this topic from a micro-economic perspective offers a first explanation about the problem of public contracts in the managerial context. The last section sets out the conclusions of the paper.

### **Legal contracts and corrupt agreements**

Both legal and corrupt contracts can be made between firms and the government. The legal contract, as its own name indicates, is made within an established legal framework and it entails an agreement between two parties where one is the entity that offers the public contract and the other one is the bidder firm. The World Trade Organization (2003) refers to a public contract as the process by which a public institution contracts a product or a service for its use and the citizens' enjoyment. For Bueb (1998) a public contract is a contract that establishes a relationship between the contracting public institution and a firm that carries out the contract by providing goods or services.

In a legal contract, in spite of there being an agreement between the parties, the acquired commitments can be breached. This action would entail dishonest behavior on the part of some of the parties. Hence, an important factor associated with the uncertainty of the execution of the agreement will always be present.

Regarding the performance of the contract, this should be carried out mainly in a private way, since the submission of the contract terms to strict legal conditions is a very slow procedure and incurs high transaction costs. Indeed, the private parties, who know the high cost of using the public legal system, have an incentive to structure contracts to avoid these procedures. And, vice versa, in order to enforce a legal contract, the lawyers interested in the execution of the contract have an incentive to prefer expensive public mechanisms of enforceability. Besides, the government does not assume the real cost of the contract enforceability since the firms assume most of the performance costs. Therefore, private mechanisms are the primary mechanism since public mechanisms increase the effectiveness of the private mechanisms and provide an important support (Wiggins, 1991).

For that reason, contracts must be specified as clearly as possible, because, when the agreement conditions are not sufficiently specified at first (incomplete contract), problems can easily occur (Lambsdorff, 2002). It is precisely the commitment to performance which defines contracts with the firm and its relationships in the long term, the magnitude of the contract and the capabilities of the parties to commit to prices and future actions (Wiggins, 1991).

Breach of contract may occur because the agents have private information, because the effort cannot be accurately measured, or because some situations cannot be foreseen (Wiggins, 1991). Holmström (1999) also justifies the existence of some commitments that cannot be fixed by contractual means, as occurs with the work force, which cannot be measured in effort units. In the same way, there is no efficient level of investment, and as result underinvestment problems can occur (Tirole, 1986; Grossman and Hart, 1986; Riordan and Sappington, 1989 and Rogerson, 1989).

On the other hand, in the corrupt contract, we have two new figures, the briber and the bribed. Corrupt agreements may imply the payment of a bribe or commission by firms. When a contract of this type is made, the firm becomes a corrupt agent. Of course, this fact will depend on the firm characteristics and its attitude in a public contracting procedure.

As occurs in the legal contract, in the corrupt contract an agreement exists between the parties and the contract between the briber and bribed can also be breached or unfulfilled, given dishonest behavior by any party of the corrupt contract. Therefore, we see how the offer or the initial agreement is often not respected. In this sense, Williamson (1979) argues that corrupt officials have an incentive to renegotiate the contract clauses in their own benefit, instead of trying to force the firm to respect the offer. These incentives related to renegotiation transform the competitive bidding process in a game between the bidder and the public official, where the initial price does not matter. Of course, it could also be possible that the intention of the firms is not to respect the initial offer, but to renegotiate the condition terms such as quality, size of the offer, etc.

The corrupt contract can also count on contract enforcement mechanisms, even if it is an illicit relationship. In this sense, contract enforcement (both legal and corrupt) presents practically the same problems and also the same solutions. Both are private contracts. Both legal contracts and corrupt agreements must have a private enforcement mechanism. We insist on the private way because the legal mechanism is slow and very expensive (as pointed out previously) and because the legal mechanism is not possible for corrupt agreements since the illegal agreements cannot be defended nor can one force the other party to legally fulfill its part of a corrupt agreement. In relation to this, Lambsdorff (2005) points out that one way of guaranteeing the

performance is to tie the corrupt and the legal relations. This is a measure used to reduce the transaction costs and to thus guarantee contractual performance. We should thus speak about relations that combine both legal and corrupt aspects when talking about guaranteeing contract performance.

Finally, we must point out that firms should seriously decide the role that they should take in this process related to bribes. In this sense, one of the most important decisions that firms should take in a corrupt context is whether to participate actively, refuse to participate or to denounce the corruption to the local authorities and outside of the country (Rose-Ackerman, 2002). The decision to refuse is the worst option since the firm not only loses the opportunity to negotiate, but furthermore does not do anything to improve the situation. On the other hand, denouncing the situation is a responsibility that can lead to an international condemnation of the corrupt officials, which could bring about reforms.

Now that we have analyzed the characteristics of both types of contracts, the next step is to think about why corrupt agreements exist, which leads us unfailingly to a cost-benefit analysis of the problem.

### ***The raison d'être of corrupt agreements***

To analyze the role that firms play when they make contracts with the government and the process of corruption that occurs in this managerial context, we must consider the motivations and the control mechanisms of firms in order to outline a cost-profit analysis of the problem. Some justify managerial corruption in public contracting. This is the result of a cost-profit analysis that could be applied to any other aspect of managerial corruption. This would also explain its justification in the public contracting context (even in international transactions).

When a bribe is established, consciously or unconsciously, both the official and the firm will consider and will value the set of benefits and costs related to the process in order to choose the contract profile to carry out. This way, when a corrupt relation is established, a priori, certain benefits are expected. The beneficiaries of corrupt contracting would be the firms, the middlemen and the officials that receive the bribes. The losers will be the government and the taxpayers (since the total price of the project increases and, therefore, there will be less available funds for other projects) and the losing firms in the bidding.

#### **The Benefits**

The principal benefit for the firm is being awarded the contract by the public administration. This contract can be more or less lucrative depending on the characteristics and volume of the contract, and possibilities of renegotiation once the contract has

been obtained<sup>4</sup>. This is a clear benefit for the firm that is derived from the contracting *per se*, regardless of whether it is legal or corrupt. For a long time, firms thought that bribes were an additional way of competing or an additional input of the product. This facilitated transactions and market access. Corruption was justified especially when other firms in the sector obtained their bids in an illegal way. In this case, the firm becomes a "victim of the system"

The benefit for the public official is a clear increase in the rents which are obtained, for example, through bribes. As was observed, this is a very opportunistic and risky position and short term oriented.

The middleman (when there is one) also benefits from the process. For example, he can act as a buyer (acquiring contracts for himself by paying bribes) and later on sell the contract to the firm that first wanted to obtain it. In such a situation, the contracts can be established between the firm and the middleman at a prefixed price and conditions, containing a compensation for the bribe. The use of middlemen is a procedure often used to eliminate the obstacles in international commercial transactions when the management pretends to be ignorant of the firm activities in order to avoid legal responsibility.

### **The Costs**

The costs of a corrupt process affect society as a whole although the main elements of the agreement also support their corresponding quotas.

Thus, the costs for the firms and for the official are, among other things, the risk of being discovered and of losing future wages, a lost reputation and even job loss, the high transaction costs, the sanctions, etc. (Carrillo, 2000, Noonan, 1984)<sup>5</sup>. There is no doubt that paying bribes affects a firm's reputation very negatively: companies know that being considered unethical can lead to high costs for them.

The transaction costs of corrupt agreements differ from those of legal ones because in the former there is a need to camouflage the costs and because the partners in such an agreement have potentially harmful information over each other. Lambsdorff (2005) argues that corrupt agreements require high transaction costs, because: 1) the agreements need secrecy, 2) the legal performance mechanisms are not applicable and 3) the corrupt partners are tied to each other even after the contract has been executed. Also, firms have another additional cost: the orchestrating of mechanisms to carry out corrupt activities as, for

<sup>4</sup> In a subsequent contracting the contract volume could be increased, or the quality of services could be reduced.

<sup>5</sup> Transaction costs are also supported by legal contracts. Thus for firms the costs of looking for partners, determining the contractual conditions and of fulfilling the contractual clauses are included.

example, collecting funds for paying bribes -slush funds- that are not visible in the accounting.

The costs for society are the most important ones, fundamentally because of their long-term nature. Eigen (1998) refers to how the costs of corruption in public contracts affect the citizens of a country. In a first stage, the government's expenses will increase. On the one hand, if corruption exists in the firm selection<sup>6</sup> phase, the preference for one of them will result in an absence of competition (injuring society). Also in this phase, there may be competition in the price determination that can also lead to collusion among the firms. In a second stage, if corruption appears during the execution phase of the contract, this will derive in a costs increment of the project or in a size reduction (in relation to the agreed terms) without the subsequent reduction in the contract price. As a result of this, the quality of the final products will decrease, the maintenance expenses will be higher and the realization of projects of inadequate size will lead to a high investment cost.

The cost-profit analysis<sup>7</sup> that the firm carries out is that the obtained benefits from government contracting (although in a non-orthodox way) will be higher than the costs of the firm being sanctioned, punished or simply damaged in value. Obviously, this analysis is often based on the short-term, on myopic behavior, on an immediate preference for the resolution of political decisions related only to the temporary period in which the politician remains in power, etc. However, firms should be aware that this behavior affects their reputation very negatively and that it can lead to the cost being too high for them in the future. In this sense, there are important international initiatives, such as those that are undertaken from the OECD, which, for example, try to put an end to tax-deductible bribery payments in the different countries and try to penalize the payment of bribes.

It seems clear, therefore, that corruption in public contracting affects both government revenue and expenditures. In addition, the more bribes in the transactions, the more regulations the public administration must establish on such transactions. Also, public officials will prefer projects providing them with easy incomes in the form of "commissions" (bribes), and hence the quality of the results will be affected. Moreover, the undue employment of scarce resources will have a negative effect on a country's development. This fact, and the lack of transparency in public procedures, will impede sustained economic growth and can finally lead to an increase in organized crime and the subsequent deterioration of democracy.

<sup>6</sup> According to Borrelli (1998), the public contracting process differentiates four stages: planning, selection of counterparts, execution of the project and test and final payment.

<sup>7</sup> See in this sense the papers by Bueb (1998), Lambsdorff (2002), Oldenburg (1987) and Bray (2005).

## Microeconomic Analysis

### Microeconomic analysis of preferences between legal and corrupt contracts

Nowadays, firms make decisions based on the established principal-agent relationship between owners and administrative officials. Within the Theory of the Firm, the Agency Theory is the most appropriate framework for analyzing the conflict of interests between economic agents (Jensen and Meckling, 1976). Agency Theory analyzes the relationships existing between parties in a contractual relationship. The agency problem takes place when the asymmetries in information between the agent and the principal appear. In such a situation, the principal delegates several responsibilities to the agent. Moreover, one has to design an incentive system for the agent to make decisions that maximize his utility function and minimize the total agency costs, and also to better align the interests of the principal and the agent<sup>8</sup>.

The main objective of shareholders, as owners of the firm, is to maximize the firm value and the welfare of society in general<sup>9</sup>. Shareholders are supposed to stand for stable performances and against corruption, and to defend the social responsibility of the firm. Otherwise, the value of the firm would be damaged, among other negative factors (sanctions, loss of reputation, etc.).

On the other hand, managers are the decision-makers when deciding to go for a corrupt contract and to offer bribes or not. The manager (agent) may be under pressure because of his result-oriented position in the firm, perhaps because it is a temporary position or the institutional environment is corrupt (for example, when asked to pay a bribe for the concession of a contract). When the main aim of the decision-maker is to become rich in the short term, we have what the literature calls myopia<sup>10</sup>, where managers prefer projects with reduced costs but with incomes in the short run.

Managers are thought to be susceptible to this type of behavior<sup>11</sup>. Bray (2005) indicates that senior managers are the ones offering bribes to ensure a business contract. Rose-Ackerman (2002) says that most bribes are paid by employers or representatives, and not by top managers, but if the illegal payments help the enterprise to get a contract, managers and owners might facilitate the bribes to be paid by the subordinates, keeping themselves apart from the "details". Therefore, we assume that managers and

<sup>8</sup> See the agency position described by Jensen and Meckling (1976) referring to the entrepreneurial area.

<sup>9</sup> If this were not so, the conflict would be between social and entrepreneurial well-being.

<sup>10</sup> See Jensen (1986) and Byrd et al. (1998).

<sup>11</sup> If corruption exists in small enterprises, the decisions of shareholders and managers are taken in the same direction.

employees may be short term oriented, and they have the same interests, considering that managers are the ones pushing employees to use bribes and, on the other hand, employees have incentives to make a career for themselves inside the enterprise.

If corruption exists (any kind of corruption), this might be due to the fact that the earnings obtained by an agent committing an "illegal act" (or because of the potential damages when not participating in the corruption process) are higher than the costs. In addition, it is possible that managers will choose a corrupt contract, not only because of the advantages derived from the cost-benefit analysis made in the previous section but because firms have considered this option, for a long time, as necessary to survive in such an environment.

In this context, we assume that a firm makes both legal and corrupt contracts. To perform a microeconomic analysis of managers' preferences when choosing between both types of contracts, we are going to use Consumer Behavior Theory. In this case, the manager will be the consumer, choosing between legal and corrupt contracts. His decisions will depend on his preferences, the available budget and some externalities<sup>12</sup>.

In this sense, we may find two different situations to be analyzed: 1) Posing of a model allowing the use of both types of contracts -corrupt and legal- where we will study two different possibilities depending on the utility function proposed, and 2) Modification of the proposed models, following the desired social codes of conduct, as for example an awareness-raising campaign against corruption, studied through an analysis of the modification of contract prices.

### Situation 1

A firm's decisions depend on two factors: the available budget and the preferences of the decision-maker.

The budget is the amount of wealth in a firm available for bidding for a public procurement contract. We assume that the budget used to cover both transaction costs and the performance of both legal and corrupt contracts is constant (M). Therefore, bribes to be paid in the case of a corrupt contract are included in the budget.

The budget line would be the following:

$$P_l \cdot C_l + P_c \cdot A_c = M$$

where:

$C_l$  = amount of legal contracts obtained by the firm

$A_c$  = amount of corrupt contracts obtained by the firm

$P_l$  = transaction and accomplishment costs of legal contracts

$P_c$  = transaction (including bribes) and accomplishment costs of corrupt contracts or agreements

Figure 1 shows how the budget may be totally used for legal contracts (horizontal axis), corrupt contracts (vertical axis) or a combination of both types of contracts.

**Place FIGURE 1 about here...**

In the next section we will analyze a firm's decisions when contracting with the public administration, considering the existence of both legal and corrupt contracts and the perfect substitution, or not, of both. We will analyze two types of situations: a) when decision-makers' preferences follow a Cobb-Douglas distribution, and b) when contracts are substitutes.

### 1) Cobb-Douglas Preferences

In this case, managers prefer to combine legal and corrupt contracts instead of making only legal or only corrupt contracts. These preferences are represented by the indifference curves of the Cobb-Douglas function

$$U(C_l, A_c) = C_l^\alpha A_c^{1-\alpha}, \alpha \in (0,1)$$

Where  $\alpha$  is a constant parameter representing the weight of factors included in the function.

In this case, indifference curves (Figure 2) are convex, which means that managers prefer to consume a constant quantity in every state instead of a large amount in one and a small amount in the other. Firms prefer to carry out a percentage of corrupt contracts even if this implies dishonest and opportunistic behavior.

**Place FIGURE 2 about here...**

In this context, the Marginal Rate of Substitution (MRS) between the two different types of contracts is measured by the slope of the indifference curve. We have to take into account that the MRS, within Consumer Theory, measures the quantity of good 1 that we are willing to substitute for good 2.

Thus, the MRS is given by the utility function as follows:

$$MRS = \Delta A_c / \Delta C_l$$

In our case, it shows the amount of legal contracts that we are willing not to make in exchange for a marginal quantity of additional consumption of corrupt contracts.

The real amount to be paid for a given amount of additional consumption may be different to what we are willing to pay. The real amount to be paid will depend on the price of the good (in our case transaction and performance costs). On the other hand, the amount we are willing to pay depends only on our preferences, not on price.

<sup>12</sup> For example, we will later consider the possibility of an awareness-raising campaign about the negative effects on society, or that there is an increase in the transaction costs of corrupt contracts (including bribes).

The manager will be willing to substitute  $C_1$  for  $A_c$  till the indifference curve is tangent to the budget line, so the MRS will be equal to the ratio of market prices ( $-P_l/P_c$ ). So, we can say that as long as the MRS is not equal to the price ratio, the manager has not made an optimal choice. In fact, if the budget line is not tangent to the indifference curve, there would always be a point near to the line, above the indifference curve, meaning that this is not an optimal choice.

However, the tangent condition is necessary but it is not sufficient for optimality, although when the indifference curve is convex, this condition is acceptable. In this case, any point satisfying the tangent condition is an optimal choice.

The amount of contracts made in the optimal choice are:

$$C_l = \frac{\alpha \cdot M}{(1 - \alpha) \cdot P_l}$$

$$A_c = \frac{(1 - \alpha) \cdot M}{\alpha \cdot P_c}$$

Thus, the manager will always use part of his budget to carry out corrupt contracts, but this will be conditional both on the price of the corrupt contracts ( $\uparrow P_c \rightarrow \downarrow A_c$ ) and on  $\alpha$  ( $\uparrow \alpha \rightarrow \downarrow A_c$ ).

## 2) Legal and corrupt contracts as substitutes

This is the case when the manager is willing to substitute legal contracts for corrupt contracts always at the same rate regardless of the initial level (constant marginal rate of substitution), and the use of one type or other (corrupt or legal contracts) will depend on the manager's preferences and their relative prices. Thus, a manager could prefer a) to make legal contracts or b) to make corrupt contracts<sup>13</sup>.

Here comes the real problem, when the manager, after making the cost-benefit analysis, decides to go for the corrupt contract. Moreover, the manager may not be interested in refraining from entering into corrupt contracts for different reasons. This would be the case of firms finding it hard to survive in such a corrupt environment without paying bribes when bidding for a public contract (this could explain why some firms that do not pay bribes in the firm's country do offer and pay bribes in the bidding process in other countries<sup>14</sup>); or it could be the case that firms

not paying the demanded bribe would win fewer present or future biddings.

Now, we are going to analyze this situation in cases where legal and corrupt contracts are substitutes at a constant rate of substitution.

In the figure below, budget is represented with a blue line, and the manager's preferences may be given by a utility function like the following:

$$U(A_c, C_1) = a \cdot A_c + b \cdot C_1$$

where  $a$  and  $b$  are constant positive parameters representing the weight of the factors in the function.

In this case, indifference curves are straight lines with negative slope.

In Figure 3 we can see that the combination between the prices of the two types of contracts and the parameters of the utility function leads to a corner solution, in which the manager only enters into corrupt contracts. This may occur either because there is a reduction in the prices of the corrupt contracts or because the manager's preferences are oriented to corrupt contracts. This would be the case of, for example, a big multinational firm interested only in contracts with fewer transaction costs<sup>15</sup>.

Place FIGURE 3 about here...

### Situation 2

As stated before, justification of a corrupt agreement could be found in the cost-benefit analysis. Managers would like to continue using corrupt agreements in order to guarantee the awarding of the contract (even when taking on big risks) or, among other reasons, they expect to get an income from the bribe paid which will be manifest in the later renegotiations of the contract, both in the size and quality of the materials used in the performance of the contract.

The point is how to reduce this type of corrupt contracting. The solution will come, in our opinion, from trying to moderate or modify the cost-benefit relationship in such a way that corrupt agreements are no longer beneficial. In this sense, we can act on the budget line or on the agent's preferences. Acting on the budget line, as we will see below, does not solve the problem. On the other hand, the preferences of the decision-making agents are not easy to modify for the reasons explained previously (managers are under pressure to obtain greater profitability, even with not very orthodox procedures). In any case, imagine that the manager's preferences change, for example, through an awareness campaign.

How would a manager's performance change when an awareness and information campaign against corruption takes place? The objective of the campaign would be for managers to only enter into legal

<sup>13</sup> There are still countries, mostly underdeveloped ones, where society accepts the existence of some kind of bribes. Therefore, for a manager carrying out legal or corrupt contracts (via bribes, commissions, etc), both types of contracts could be substitutable.

<sup>14</sup> According to Transparency International, countries with less corruption are those whose enterprises are the most corrupt ones abroad.

<sup>15</sup> If, on the contrary, there were an increase in the prices of corrupt agreements or preferences were oriented to the realization of legal contracts, the optimal choice would be at the other corner.

contracts and reject and denounce corrupt contracts. This could be done by getting managers to understand that corrupt contracts are detrimental to society in general and to the firm in particular, discouraging them from carrying out such contracts.

Let us thus assume that at one point the prices of corrupt contracts increase, owing to higher transaction costs (including bribes) and performance costs of the corrupt contracts. This would be a measure to be taken against corruption. If the awareness campaign were successful, there would be fewer corrupt public officials, meaning that the costs of identifying and finding an adequate partner in the corrupt agreement would be very high for firms.

Now, we are going to look at the analysis of this kind of situation, observing how the amount of corrupt contracts varies when there is a variation in price.

### 1) Cobb-Douglas Preferences:

Suppose that there is a variation in prices so that  $P_c' > P_c$ .

The budget variation is represented in Figure 4 with a red arrow, and the resulting budget is represented with a red line.

This results in a change in the manager's optimal choice, in the following way:

$$C_l = \frac{\alpha \cdot M}{(1 - \alpha) \cdot P_l}$$

$$A_c = \frac{(1 - \alpha) \cdot M}{\alpha \cdot P_c'}$$

where  $P_c' > P_c$  and, also,  $P_c' > P_l$

**Place FIGURE 4 about here...**

The variation in the price of one of the goods gives rise to two different effects (see Figure 5): it results in a change in the marginal substitution rate (MSR) and the acquisition power of our budget is also altered. The change in the demand due to a change in the MSR is called a "substitution effect". The second effect, the change in the demand due to a lower acquisition power is called an "income effect".

We can see both effects in Figure 5:

**Place FIGURE 5 about here...**

First, the budget line pivots around the original choice, and then this line shifts outward to the new demanded bundle (Varian, 1990) The first step- the pivot- is a movement where the slope of the budget line changes while its purchasing power stays constant, while the second step is a movement where the slope stays constant and the purchasing power changes.

In the optimal choice, the relative weight of corrupt contracts will be lower. But it is worthwhile to observe that in this case, even if the costs of corrupt contracts are higher, managers will still demand them (even if less so than before). This means that our problem would not be completely solved. This is due to the shape of the indifference curves, i.e. to the manager's preferences, which are independent of the available budget.

If the price of corrupt contracts increases to extreme situations (see Figure 6) (due to greater control on the part of the administration, awareness campaigns, an increase in the bribes to be paid to compensate the risk of being discovered, etc.), we will find situations in which consumption of corrupt contracts will be drastically reduced. However, because of the characteristics of the Cobb-Douglas functions, we will never get a corner solution where consumption of corrupt contracts is zero. This is due to the fact that the consumers always prefer to consume a certain amount of both contracts, instead of only legal contracts or only corrupt ones.

**Place FIGURE 6 about here...**

### 2) Legal and corrupt contracts as substitutes

When dealing with substitute products with a constant rate of substitution, consumers will choose the cheapest one. In this way, if our purpose is to make managers replace corrupt contracts with legal ones, we need to find the way to reduce the costs of legal contracts.

Let us analyze the consumption of the corrupt contracts depending on the price variations, always assuming that legal and corrupt contracts are substitutes at a constant rate of substitution.

In this way, consumers will demand the following amount of corrupt contracts:

$$\begin{aligned} & M/P_c \\ & \text{when } P_c < P_l \\ & 0 < x < M/P_c \\ & \text{when } P_c = P_l \\ & 0 \text{ when } P_c > P_l \end{aligned}$$

Let us focus on the third possibility, where the price of corrupt contracts becomes higher than the price of legal contracts ( $P_c > P_l$ ) (see Figure 7). In this case, managers will only consume legal contracts, which is what we are looking for.

**Place FIGURE 7 about here...**

So, the substitution problem of corrupt contracts for legal ones would be solved by increasing the costs of the corrupt contracts, in cases where corrupt contracts and legal contracts were substitutes at a constant rate of substitution in the minds of managers. We note that the modification of the indifference

curves would be a way of solving the problem of corruption in public procurement<sup>16</sup>.

### 3) When corrupt contracts become “bads”

Now, we raise the question of how managers’ decisions would change if an awareness and information campaign created in the mind of managers the idea that corrupt contracts are “bads” (until now both corrupt and legal contracts were considered as “goods”) for society in general and for firms in particular. This means that the consumption of corrupt contracts creates a disutility or negative utility to managers. In this case, managers would be interested in consuming as few as possible of this type of contracts.

In this case, managers’ preferences would change, independently of the variation in the prices of the contracts and the budget line. Even changing the budget line, the optimal choice would be the same; there would be a consumption of only legal contracts (see Figure 8). This change in preferences is translated into a change in the indifference curve, which will now have a positive slope, which means that the acceptance of an additional amount of corrupt contracts would only be compensated (in the mind of managers) with an additional amount of legal contracts.

This would be the case of those situations where managers adverse to corrupt contracts are in negotiations with public officials in which the existing legal bonds would be reinforced by the corrupt agreements (Lambsdorff, 2005). Corrupt contracts are “bads” and legal contracts are “goods”. Therefore, points on the right of the indifference curve would be better choices for managers and points on the left of the indifference curve, worse choices (see Figure 8).

The optimal choice would be the one in which managers spend their budget only on “goods” (legal contracts), as seen in the figure below:

**Place FIGURE 8 about here...**

The budget line is represented by the blue line. Managers’ preferences will give a corner optimal choice.

### Microeconomic analysis of the risk of non-performance of contracts

As already stated, the managers of the firm are the ones making decisions to carry out corrupt agreements or not. Even under the pressure of being asked for a bribe by a public official, managers always have the option and capability to accept or refuse a corrupt contract. The decision will depend on

their preferences, the available budget and some externalities (variation in the prices of the contracts, higher sanctions when discovered, an awareness campaign on the negative effects of corruption, etc.).

Once a firm decides to carry out a corrupt contract in a public procurement procedure, there are some factors that need to be taken into consideration: dishonest acts committed by public officials (renegotiation of the contract, further bribes, non-performance of the corrupt contract, threat of public advertising of the corrupt agreement) or by third parties (blackmail and extortion by third parties who have confidential information on the corrupt agreements being carried out and who threaten to denounce them publicly), damaging the public image of the firm and possibly, the unenforceability or loss of the contract.

Thus, in this section, we are going to analyze the behavior of the firm or of the manager in relation to the decisions to be taken under uncertainty in a public procurement contract procedure. The performance or non-performance of a contract is related to the uncertainty as to whether dishonest acts by public officials or third parties would occur in the contracts carried out by the firm<sup>17</sup>.

In order to analyze the risks associated with the non-performance of a contract, we need a model that considers risk explicitly. This model is the portfolio selection model, provided by Finance Theory. Based on this model, we can analyze the selection of portfolios and apply the principles of the model to the selection of contracts to be carried out by the firm.

In our model, there are only two assets to invest in. One of them is the risk-free asset with a fixed rate of mean income,  $r_f$ . In our case, the legal contract is associated with less risk, so we can approximate its behavior to the risk-free asset. The second asset is a risky one (in our case, the corrupt contract). In general, firms can decide to spend the budget on both corrupt and legal contracts.<sup>18</sup>

Therefore, we have a new situation in which our axes measure the risk and income associated with a specific portfolio selection. There is a linear statistical dependency that expresses the expected income of a mixed portfolio of both types of contracts<sup>19</sup> and describes the balance of the market between risk and income in the adoption of different contract profiles. The slope is now positive, as a higher risk is

<sup>16</sup> This statement could offer an argument to justify the fact that, from the theory of the firm, the control of management will stand out as a mechanism of control of inefficient behavior.

<sup>17</sup> In order to analyze the risks associated with the performance of a contract, we will study the case of the corrupt contract, although all the reasoning could be applicable to the legal contract as well.

<sup>18</sup> In both cases, the performance or non-performance of the contract could occur. If the behavior of the parties is honest, the firm will have good results. If contracts are not performed, the results of the firm will get worse.

<sup>19</sup> Such reasoning is based on the definition of *capital market line* or *securities market line*, which expresses the theoretical condition of equilibrium between income and risk for the individual assets or a portfolio.



associated with a higher income of the portfolio. In some way, it measures the cost of a portfolio of having a higher expected income in relation to the higher associated risk or standard deviation.

If we invest  $x$  in the risk asset and  $(1-x)$  in the risk-free asset, the mean expected income of our portfolio will be a weighted mean of expected means. In this way,

If  $x=1$ , we decide on the risk asset  $A_c$  and we have a standard deviation and an expected income ( $\sigma_c$ ,  $r_c$ ).

If  $x=0$ , we invest all the budget in the risk-free asset  $C_1$  and have a standard deviation and an expected income ( $0$ ,  $r_f$ ).

If  $0 < x < 1$ , we have a portfolio of legal and corrupt contracts.

where

$r_f$  is the income of the risk-free asset

$r_c$ , is the expected income of the risk asset (corrupt agreement)

$\sigma_c$  is the standard deviation of the income of the corrupt agreement.

It is easy to understand that the income of the risk asset is higher than that of the risk-free asset income ( $r_c > r_f$ ), due to the fact that an investor adverse to the risk would not acquire a risky asset if it had a lower expected income than the income of the risk-free one. Thus, the additional risk would be compensated by a higher expected income.

From a microeconomic point of view, it seems feasible to postulate that a decision-maker in a firm is interested in knowing the probability distribution of an agreement or contract being honest or dishonest. Thus, the manager in charge of signing a contract will decide to do it in a legal or corrupt way based on the probability of the performance of each one.

Among all the alternative functions of utility relating to managers' preferences, in this case, the convex shape would be the most appropriate, meaning that the manager would prefer a constant quantity of both types of contracts to a larger amount of one type of contract and a smaller amount of the other ones; firms would prefer to carry out a percentage of corrupt contracts even if there is the possibility of dishonest or opportunistic acts<sup>20</sup>.

We can establish indifference curves showing managers preferences for risk and income<sup>21</sup>. If managers are adverse to risk, a higher income will improve their well-being and a higher standard deviation will make it worse. This implies that a model of risk aversion has a positive slope, as shown in Figure 9.

Place FIGURE 9 about here...

When optimally choosing a portfolio, the slope of the indifference curve must be tangent to the portfolio line (Figure 9). The slope measures the price of risk, or what is the same, the amount of risk and income that can be interchanged, when choosing a portfolio. Therefore, our optimal portfolio choice is the one where the marginal rate of substitution between risk and income is equal to the price of the risk.

Analyzing the figure, we find that the price of the risk is the following:

$$Pendiente = \frac{r_c - r_f}{\sigma_c}$$

Therefore, based on the financial models, we can analyze the formation of contract portfolios, which would justify the choice of both types of agreements (even though the corrupt ones are not desirable) or the choice of them associated with greater or smaller risk and uncertainty, both to satisfy the manager's (or public official's) preferences, and to guarantee the performance of the contracts.

Firms, while choosing between the two different contracting profiles are, in fact, choosing income as a function of the risk they are willing to accept. We understand that corrupt agreements always have more risk (the risk of been discovered, sanctions, loss of reputation, etc.). This way, firms choose the risk they want to assume and create diversified portfolios in this sense and even defend the formation of diversified portfolios on a specific occasion.

In summary, when we accept the fact of a possible "atypical" contracting by firms, we advance one more step in our research and try to understand why corruption persists in the firm context. It seems that, up to now, we have seen that if individual choices do not change, the problem of corrupt contracts continues. If this is the case, we wonder whether the firm may not be interested in putting an end to corrupt contracts for the different reasons previously argued. In this situation, we pose an analysis in which it could occur that the decision-making agents in firms, seeking to maximize firm profitability in the short or medium term and without taking into consideration the shareholders' objective to create wealth in a long term, would try to obtain a contracts portfolio that guarantees maximum profitability and minimum risk, even though the portfolio includes corrupt contracts.

## Conclusions

In this paper, we have analyzed the role that firms play in the process of public contracting and we have tried to understand why corrupt deals exist and persist in companies. The literature often refers to the phenomenon of corruption in relation to public

<sup>20</sup> Nevertheless, and depending on managers' preferences, other utility functions could be used.

<sup>21</sup> This model assumes that managers' preferences depend only on mean income and variance.

contracts but nevertheless contributions hardly exist concerning the role of firms contracting with the government and the corruption process that takes place in this managerial context.

In this line, we wondered whether the firm would sometimes be motivated to not stop corrupt contracts for different reasons. It could happen that a firm would have difficulty in surviving within a certain environment, if, for example, it did not pay bribes or share the principles demanded by that society, or if it could not otherwise have access to public contracting because some countries or public officials demand that it be this way, or if the company were to obtain fewer present or future bids if it did not pay the bribe demanded, etc.

In order to analyze these phenomena, we first reflected on the coexistence of corrupt and legal deals in the relationships between the firm and the government, taking special account of their performance. In a second stage, we examined why corrupt contracts take place and by means of a cost-profit analysis we observed that corrupt contracts could be justified in some contexts.

Microeconomic analysis provides a very useful tool for analyzing the coexistence of legal and corrupt agreements. It even helps us to understand the reason why managerial corruption is often justified in this public contracts context. That is why we first tackled the role that firms play in this context, and then an analysis was outlined in which we explained the choices a firm makes when dealing with the government, taking into account the existence of legal and corrupt contracts and the substitution or not of both.

In a first stage, we posed a model that allows us to analyze management preferences depending on the utility function they have. In a second stage, we posed the modification of the models when the established rules of society are pursued, for example, in the realization of anticorruption campaigns or the modification of contract prices. Furthermore, the costs or sanctions could increase for contractual non-performance, a new bribe could be demanded of the firm or the transaction costs in the company may simply increase.

The model shows how modifications in the (available) budget of the firm are not relevant in mitigating corruption problems. However, it is possible to act on managerial preferences so that, at least in the long term, the preferences of the management will be modified and, in this way, the portfolio of corrupt contracts will be reduced and corruption will be lessened. We thus outline a first means for getting closer to legal (desirable) contracting by modifying individual choices.

Thus, when individual preferences adopt a Cobb-Douglas distribution, the optimal choice will lead us to a decrease in the relative weight of corrupt deals. But our problem would not be totally solved since even though the costs of corrupt agreements increase,

the management will continue to demand them. This is due fundamentally to the form of the utility function, i.e., to managers' preferences, regardless of the budget they manage. However, when in the model legal and corrupt contracts are substitutive goods, our problem of substitution of legal contracts for corrupt agreements would be solved with an increase in the corrupt agreements costs. As proof of the relevance of the preferences we have the following situation in which we suppose that, through an awareness campaign, the corrupt agreements become "bads", so that with the variation in the management utility curves, any modification in the budget would also lead to a resolution of the problem.

Once we outlined the possible atypical contracting by firms, we went a step further in the study and attempted to understand why corruption persists in the managerial context and why contractual non-performance takes place. Decision-makers may have difficulties in modifying their preferences because they prefer their firms to continue diversifying portfolios that maximize short-term profits. That is why we analyzed a model in which firms pursue a contracts portfolio to guarantee maximum profitability and minimum risk, even though the portfolio includes corrupt contracts. Hence, based on the portfolio models that financial theory proposes, we have analyzed firm behavior related to public contracting decisions in an uncertain context. In this sense, we describe a new situation in which we observe the risk and profitability associated with a portfolio. We can thus analyze the formation of portfolios and this would justify the choice of both corrupt and legal contracts or the choice of contracts associated with greater or smaller risk and uncertainty.

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Figure 1

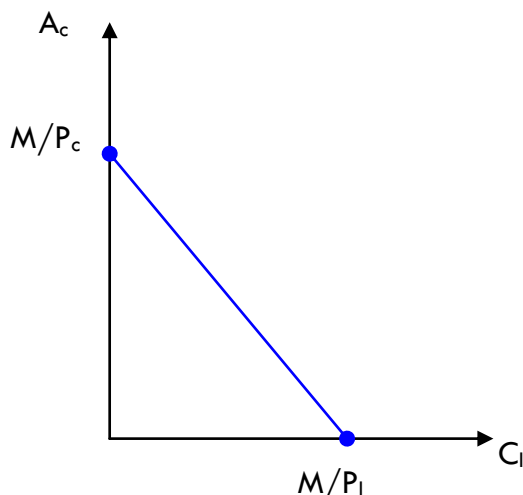


Figure 2

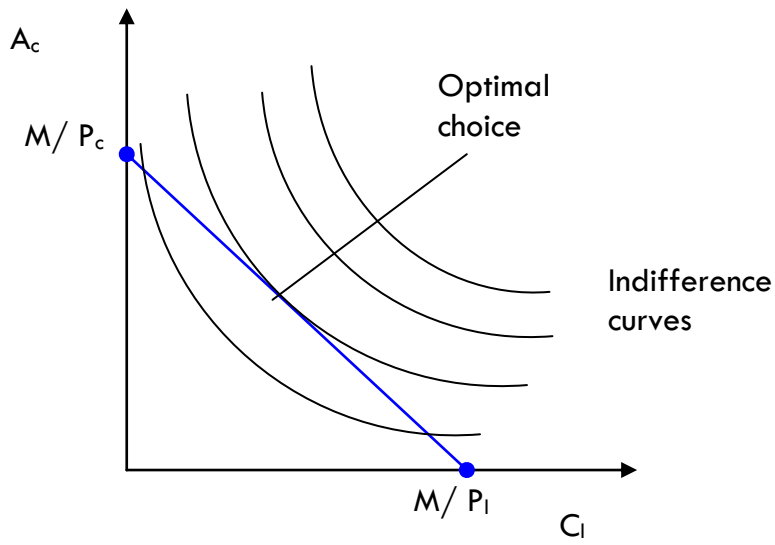
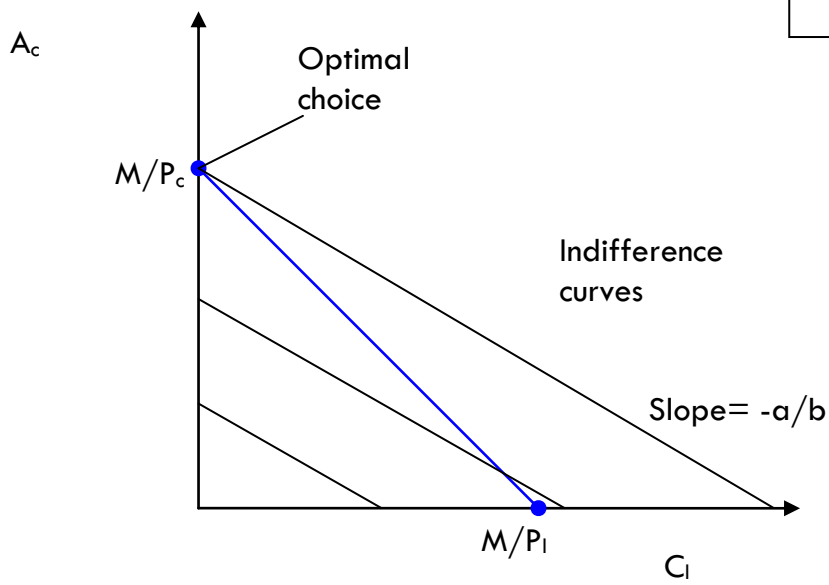


Figure 3



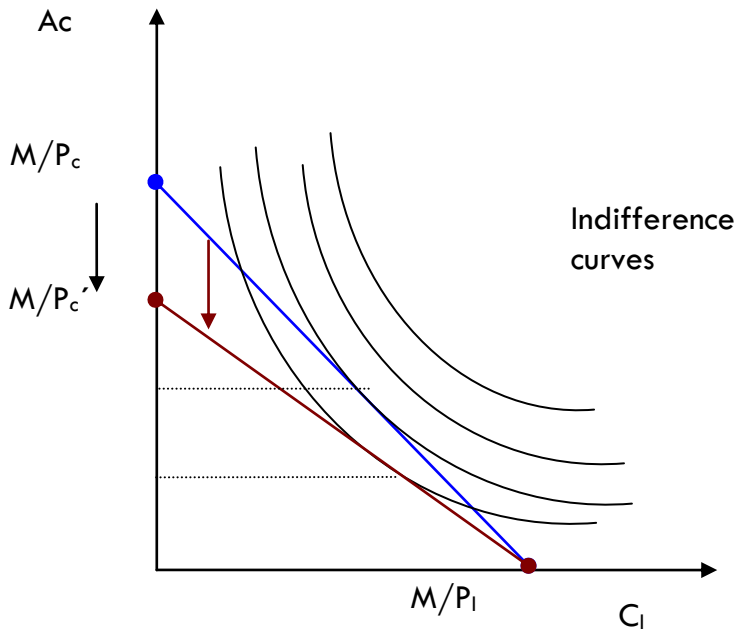


Figure 4

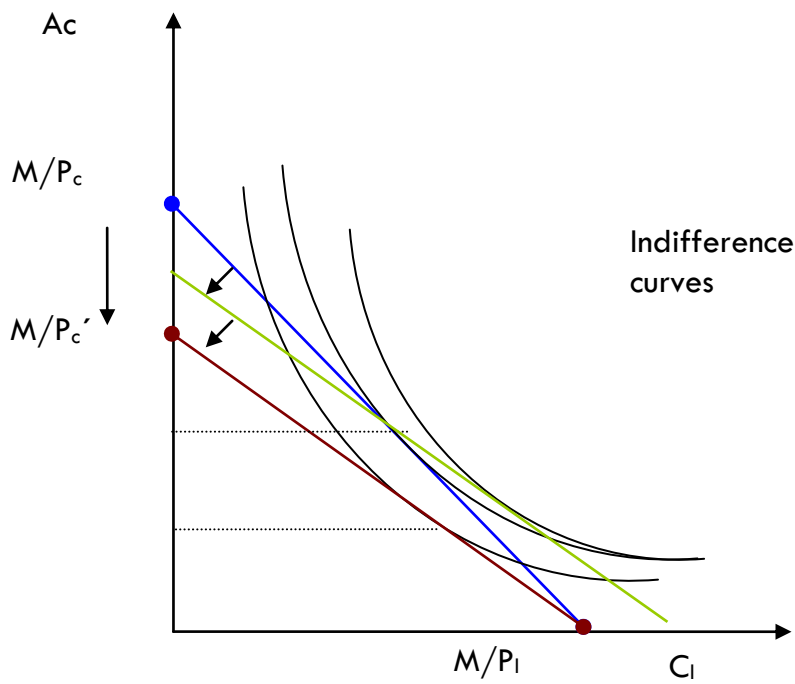


Figure 5

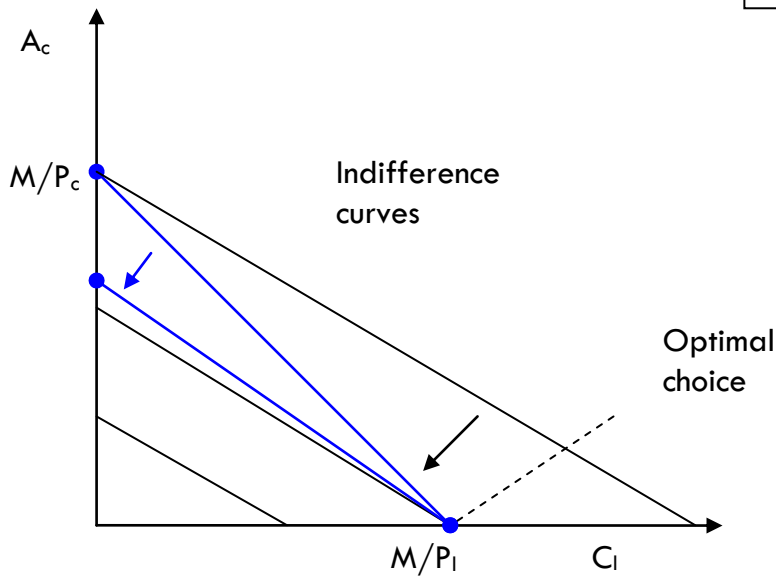
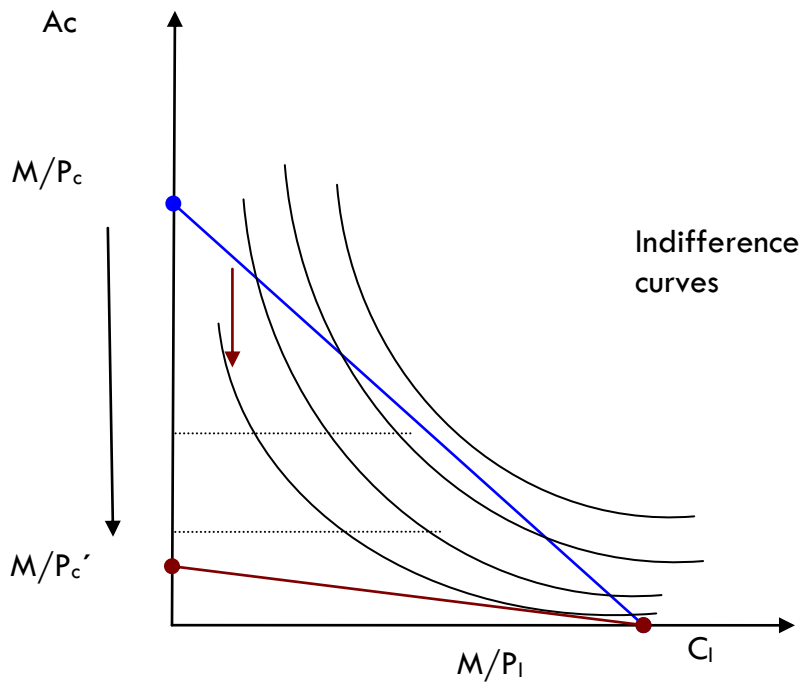


Figure 8

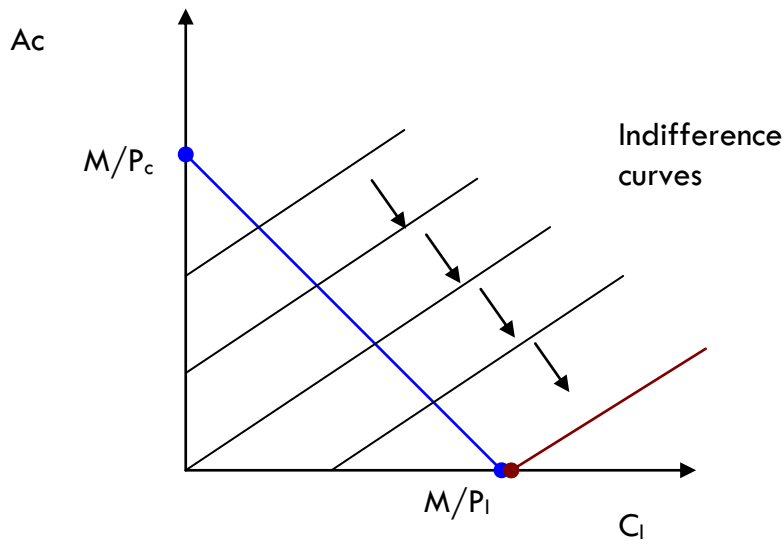


Figure 9

