THE ABILITY OF AN ABSOLUTE KING TO BORROW DURING THE SIXTEENTH AND SEVENTEENTH CENTURY. SPAIN DURING THE HABSBURG DINASTY[1]

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Abstract

The Spanish Monarchy borrowed foreign credit during more than 150 years despite repudiating its agreements from time to time. This paper explores why the prospect of future repudiations was not an obstacle for lenders to keep offering credit to such a risky sovereign.

According to the extant literature on sovereign debt, lenders should not have lent any money to the Spanish Monarchy, especially because they were not organized as a cartel. Sovereign debt theory asserts that the principal constraint on sovereign behavior is the penalty that lenders or an external organization can impose on the borrower. When the sovereign decides whether to honor the loan agreement, his main consideration lies on the size of the penalty he will suffer in the event of a default. The inability to punish the sovereign does not lead to indiscriminate reneging, but to an absence of credit. Thus, the extant theory cannot explain the borrowing that took place in Castile during a large part of the Habsburg dynasty (1516-1665).

This paper explains why, in the absence of penalties and having experiences of defaults, bankers kept lending. The mechanism that made this credit possible was based on expectations of the king's revenues in any given period. Bankers did not have to punish the sovereign because the king was trying to cooperate with many lenders to reduce uncertainty about future credit and to expand the amount of money available.

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Introduction

It is widely known that the Spanish Monarchy had a great capacity to borrow from foreign bankers during the sixteenth and seventeenth centuries. Scholars have described the financial system of Castile and the important role played by the credit to maintain the imperial policy. (Carande 1949-67; Domínguez Ortiz, 1960; Ulloa, 1963; Artola, 1982, Ruiz Martín, 1970; Boyajian, 1983; Maddalena e Kellenbenz, 1986). The Spanish Monarchy was able to borrow from many merchant-bankers in order to pay for its wars in Europe. Many foreign companies, especially Italian, provided money and financial services to the Spanish kings.

The Spanish Monarchy, as well as other medieval and early modern European sovereigns, had problems making credible commitments to honor its financial agreements (North, 1990, 1993, Hoffman and Norberg, 1994). Periodically, there were financial crises involving suspension of payments by the Crown, bankruptcies of some bankers, and defaults in the contracts. These crises damaged the relationship between the Monarchy and bankers over time, but the crises were not an obstacle to get more credit over time.

The history of sovereign debt in this period poses a puzzle: why did bankers continue to invest in loans to the King of Spain who repeatedly suspended his payments? As expected, the king could cancel his obligations whenever he wanted to after the lender had risked his money. One could argue that reputation and future borrowing needs could prevent the Monarchy from cheating the banker. However, the bankers and the king knew their relationship was finitely lived, so bankers could look forward and anticipate that the king would default in the last period. Carrying this logic further to earlier periods would lead to an outcome in which lending would not have been provided in any period. Historical evidence proves, however, that despite a finite horizon, and the periodic cheating of the king, lenders and Spanish Monarchy continued to cooperate and maintain their credit relationship.

This puzzle can be rephrased as follows: how can the close relationship between bankers and the Spanish Monarchy be explained for all those years? Did they make “irrational” economic decisions? What were the gains for bankers from lending to such a dangerous debtor? This lending is especially notable, given that bankers did not coordinate their actions. In the absence of a group penalty, why would the king pay when he could expropriate the funds without suffering harsh retaliation? The institutional literature predicts

that without credible institutions for protecting property rights, such credit would not have been provided. Sovereign debt theory analyzes reputation as arising through repeated interaction that generates equilibrium with self-enforcing lending agreements.

Theory and evidence concentrate on the ability of organized bankers to punish kings who renege on their debts. Sovereign debt theory says, that the principal constraint on sovereign behavior is a penalty, *P*, which lenders can impose on a sovereign (Bulow and Rogoff 1989, Eaton et all 1986). This penalty also provides a ceiling on the level of sustainable debt.

Bulow and Rogoff (1989) assume that lenders can impose additional and more costly penalties beyond cutting the sovereign off from credit in the future. The debt ceiling increases with the severity of the punishment. But lenders do not lend as much if they are not able to coordinate a boycott because the boycott is their best penalty. Cole and Kehoe (1994) explore an additional penalty model where sovereign and lender receive benefits by cooperating in a related no-lending relationship. The lender links cooperation in a no-lending relationship to the repayment of loans by the borrower. It creates a penalty to sustain positive lending. Grossman and Van Huyck (1988) and Atkeson (1991) also derive positive lending equilibrium when partial defaults and debt rescheduling are not violations of the agreement between sovereigns and lenders, but an unexpected fiscal shock suffers by the sovereign. In this case, the lenders do not implement the penalty.

Recently, Conklin (1998) has applied some of these debt models to study the loans provided by a group of Genoese bankers to Philip II of Spain (1556-1598). He considers this group of bankers as a cartel and identifies a boycott as the penalty imposed by the group to enforce their loans. There are two problems with his explanation. First, there was no cartel during the reign of Philip II and neither before or after his reign. Second, what were the incentives of bankers to initiate the boycott, to implement the penalty, given that some of them were hurt by the arrangement reached to restore the credit negotiations?

Weingast (1997) has developed a model that explains how the institutional change following the Glorious Revolution in England allowed a dramatic increased of the government's credit limit. His model concludes that a limited sovereign would have more opportunities to get larger amounts of credit than an absolutist. Again, the penalty of the lenders is the key of his argument. In the English case, the Parliament would limit the king to renege the contracts and helped the coordination of lenders to punish him largely for a credit boycott in case of default.

The problem with "penalty" models is that they require a strong ability by lenders to punish the sovereign in case of default. Moreover, for the penalty to be credible, bankers need to coordinate their actions. Otherwise, the inability to strongly punish the sovereign implies an absence of lending (Greif, Milgrom and Weingast 1994). From the declining marginal productivity of capital it could be derived that

the sovereign would be indifferent between obtaining the last loan or not, and it would be an incentive to cheat the last lender.

This paper shows that the Spanish Monarchy, despite being an absolutist government did not need to be controlled by other institutions to have access to important amounts of credit. The kings of Spain got enough credit to maintain their wars because of a particular game created by the Monarchy to bargain with its bankers. Bankers had enough incentives to lend in some circumstances, even though they were not a cartel and they did not have enough power to punish the sovereign.

Another issue explored by the literature of sovereign debt is the limits of credit available for the sovereign. Models imply that any increase in the penalty that can be imposed on the sovereign will increase the amount of credit available. However, the literature does not explain the problems for the sovereign derived from a very strong group of bankers. If the bankers were so powerful against the king that they could control his actions, they would be able to increase the price of their loans. The king would be a price taker with a horizontal demand curve of credit, while the bankers would be price searchers with a demand curve negatively sloped, reflecting their market power. They could control the price and quantity of credit, maximizing his profits by choosing the amount of credit for which marginal revenue is equal to marginal cost.

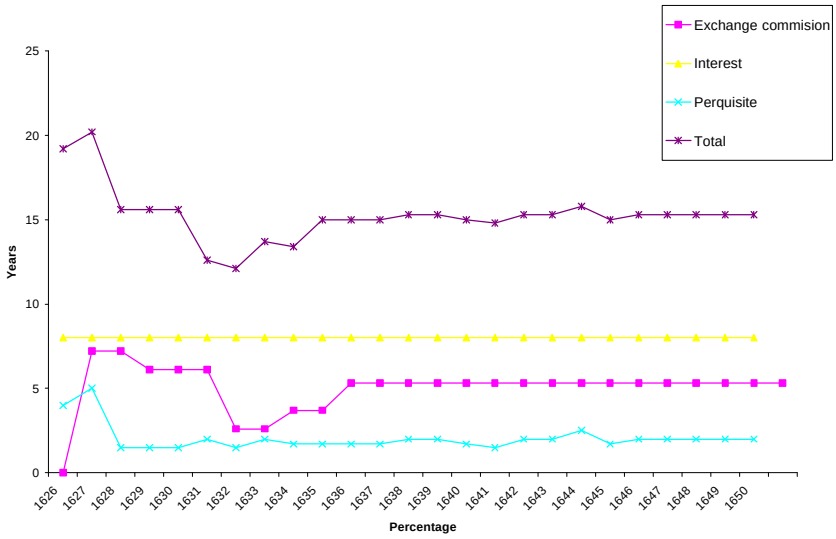
There are two consequences derived from this situation. First, the amount of credit would be less than it would be supplied at the intersection of the price of the marginal cost curve with the demand curve. Second, supply of this amount of credit results in a higher price for the sovereign at every amount of credit. A coordinated group of bankers will offer less credit than several lenders in competition facing identical cost functions and the same demand curve from the king.

Traditionally, historians have explained the credit of the Spanish Monarchy by a high risk-premium paid by the king in the loan contracts, also called "*asientos*". This would explain why the Monarchy was always complaining about prices. However, historical evidence does not corroborate this claim. The interest charged in the *asientos* experienced a decline between the reign of Carlos I (1516-1558) and Philip IV (1621-1665). For example, the interest rate of the "*asientos*" stood at 14 percent per year during the sixteenth century[2]. After 1609, with the truce in the Low Countries, the rate dropped to 12 percent for the first year of the contract and 8 percent thereafter. The 8 percent interest was the base rate that the Crown paid on straight borrowing on Castile, whenever foreign exchange and foreign remittances costs were not involved (Figure 1). This rate was comparable to short-term interest available anywhere, including places like Amsterdam[3]. Furthermore, high interest charged in the credit contracts does not resolve the risk problem involved in this relationship. The king could revoke his promise of repayment anytime after the banker advanced the money.

[2] Carande (1968), vol. 3, p. 12.

In order to explain the Spanish Monarchy's case, this paper presents a model focused on the sovereign's incentives to extend cooperation over time rather than on the lenders' power to punish him or the existence of an institution to control him. Here we consider two important elements: First, the powerful self-enforcing nature of the value that a stable cooperation with the bankers over time had for the sovereign. It does not depend on the lender's penalty but on the conditions that make the credit cooperation an essential part of the financial system of the Crown. And second, we show the importance of the banker's beliefs about the true interest of the king in keeping his promises.

Figure 1. Cost of the "*asientos*" signed by Portuguese bankers, 1626-1650.



Source: Boyajian (1983), p. 166, table 7.

This paper has three sections. First, section I explains the incentives of the Spanish Monarchy to establish a permanent cooperation with foreign bankers and its characteristics. Section II presents a model of cooperation as a game with potential gains for each player. The third part, section III, uses historical data to show how well historical events correspond to the assumptions and predictions of the model. The final section IV concludes.

I. Reasons for the king to borrow short-term credit from foreign bankers

The Spanish Monarchy needed large amounts of money every year to pay its armies and other expenses in Spain and in the balance of its European territories. Taxes were collected throughout the fiscal year while expenses had to be done monthly. Surpluses from the fiscal system of Castile made it possible to support this effort during the sixteenth and seventeenth century, but the Crown had to transfer its money

[3] Boyajian (1983), p. 168.

from Castile to different places in Europe in order to pay its army with regularity in Antwerp, Germany and Italy, far away from the centers where the main revenues were collected.

If the king wanted to have credit in different places of Europe and different currencies, it was essential to have access to a vast financial network of agents able to transfer money safely and quickly to different places. The Monarchy did not have the administrative efficiency that merchant-bankers could provide. These bankers had developed complex networks during the Middle Ages in order to trade, to provide credit to the commercial sector and to speculate in the financial sector. These networks were used by the Monarchy to gain credit and financial services more efficiently than using royal officials.

In the first decades of the sixteenth century, the Crown tried to get part of its credit borrowing from commercial creditors, in the flourishing Castilian and Brabant fairs[4]. Independent and small merchant-bankers, that many times they did not live in the court, provided credit to the Monarchy. Soon problems emerged. If royal officials could not pay their assignments on time (i.e. because the treasure fleet from America had not arrived yet), the payment dates of the Castilian fairs had to be extended, affecting all commercial businesses. The first time this happened was in 1543. After that date, extensions were more frequent and of longer duration, upsetting the cycle of the fairs of payment[5]. As a consequence, many merchants went out of business, and bankruptcy spread quickly among commercial businesses. This situation also hurt the Monarchy because it was very difficult to borrow again the following year. Some years later, in 1568, the Monarchy had even more problems borrowing in these kinds of markets because the Rebellion in the Netherlands blocked the exports of wool to the Low Countries, reducing the trade and the amount of money available in the hands of local merchants[6].

The ideal scenario for the Crown would have entailed a big and strong credit market with many lenders able to offer all the credit that was needed. Fairs could not play this role because they had been created to support trade, not to lend and transfer large amounts of precious metals around Europe borrowed by only one person. Moreover, the risk and the urgency of these credit demands increased the price that the king had to pay. A good example of this situation was the high prices that the Monarchy paid in Catalonia when it borrowed among the local merchants in 1575. Many of the bills of exchange issued in Barcelona payable in Lyon had 5 to 11 percent interest rates for only two or three months[7]. It was three or four times the regular price of a normal credit contract ("*asiento*") signed on with a banker in Madrid.

Over time the Crown solved this problem by creating its own personal credit market, setting up bilateral and stable relationships with the most important merchant-bankers of Europe. The Crown signed loan contracts, formulating and scheduling the whole compensation scheme, including interest, for the

[4] Ruiz Martín (1970).
[5] Van der Wee (1977), p. 368.
[6] Ruiz Martín (1970), p. 98.
[7] Hernández (1997), p. 77.

bankers. The debt was usually paid between one or three years after the lender had advanced the funds. Repayment included other non-monetary rewards, like honors, protection in the territories of the Monarchy, licenses to trade in America, and social prestige, among others. An important characteristic of the credit negotiations was that most of bankers or their agents stayed in the court, living close to the king. The Council of Finance always promoted it. Every year the official credit negotiations in Madrid with a small number of bankers permitted the king to borrow the most important part of its credit avoiding capital markets.

The international network controlled by big merchant-bankers enabled them to mobilize private savings to lend to the Spanish Monarchy. The circle was closed by transferring capital from Spain to their correspondents regularly, using mechanisms like the bill of exchange and the "ricorsa" (Mandich, 1953)[8]. This mechanism permitted the Crown to extend the time required to repay its debts for years, according to its fiscal system, and avoid the very short terms demanded by the lenders from commodity markets and fairs.

II. The game of credit: a model

Consider a simple two-stage game with complete but imperfect information. There are two players: the king and a banker. They interact as follows: First, the king borrows from the banker a certain amount of money *K* and several financial services *F*, offering him a contract ("*asiento*").

The *asiento* signed between a lender and the sovereign takes the form of a promise by the sovereign to repay the principal of the loan *K* plus interest, *i*, and a non-monetary reward, *T*. However, the lender will not receive the whole monetary profit (*K* plus *i*) promised in the contract at the end of the game. The sovereign will retain temporarily a portion g1 of the total monetary gains of the banker. This amount will be paid as debt in the future.

The opportunity to borrow from a banker is an important benefit for the king and it is represented by the variable called *V*. This means how much the relationship with the banker is important for the king. *V* modifies the king's payoffs. When the king does not need bankers, *V* is negative, and the contrary makes *V* positive. We assume that *V* has a large value because the king always needs credit and financial services from the bankers. The value of *V* is linked to the conditions that allow the king to establish a relationship with the banker. They are political, economic and social factors. Among the most important are the revenues

[8] The bill of exchange was a common mechanism used by bankers and merchants to transfer funds between different cities. In the standard bill transaction, the purchaser of a bill of exchange understood that the value paid for the bill, minus any exchange costs, was repayable by the drawer's (seller of the bill) correspondent at a future date, and in another location. Usually, the banker drew such bills on their correspondents to pay the subsidies as provided in the credit contract. The banker had only to draw his own bill directly on a foreign correspondent, payable to the correspondent on his orders. Provided that he accepted the bill, the correspondent noted it as both a credit to himself (or the third party) and a debt, or charge, against the lender's account. By prior agreement between the banker and the correspondent, the latter also cleared the debt with a bill, which he drew on the banker in the same amount, or perhaps by bullion sent some time later.

available to borrow by the Monarchy. The rest of variables in this game are fixed by the negotiation between king and banker in a contract of credit and they are well known by both players (See all variables in appendix I).

The revenues of the king are an important element in the game

The value of *V* in the payoffs is linked to the financial situation of the Monarchy each time the game is played. The sovereign will honor his promises made in the contract of credit when he has enough revenues to repay and gain his political goals. The problem surges when the king has only enough money to do one of both things. In this case, the banker will be less important than political issues, even though his role in the financial system is very important for the king. The king needs the banker to provide credit in order to pay his armies in other countries, but if he does not have enough revenues to give the money back to the banker and to pay the armies, he would prefer to cheat the bankers rather than to lose the war.

By canceling payments, the king would not lose anything in terms of credit, because at that point he had not enough money to get it. But with the suspension of payments he can save at least a positive expense in the present period (the amount of debt) and he gets a certain amount of money, *K*, if the banker has decided to cooperate. Recovering the old debt, he could pay the present expenses or perhaps to borrow again in a new game.

The ability of the king to fulfill the loan contract lies on exogenous factors that are private information of the king. The variable that shows whether or not there are enough revenues is *r*. This variable is exogenous to the game and it may change in each game because it depends on the fiscal system. However, the banker could observe it. When there are not enough revenues to pay the bankers in the game, *r* is zero. The king will not have any interest in honoring his agreements even though *V* had a huge value. Without enough amounts of revenues, the sovereign will prefer to use them to pay the war for itself, even when he does not have the same ability to transfer money as the lender. When the amount of revenues allows the king to borrow all credit that he needs in the war, then he will repay it to maintain the cooperation of the banker.

The variable *r* makes the relationship between the king and the banker a game of complete but imperfect information. It is complete information because each player's payoff function is common knowledge, but it is imperfect because the banker does not know exactly the value of *r* when it is critical to determine whether the king is going to cooperate or not. The banker is very interested in calculating its real value before accepting the contract. And the sovereign is also very interested in showing the lender that *r* is always 1 in order to get his cooperation.

In order to know the value of *r*, the lender should have to know the amount of revenues available (See appendix II). For simplicity, this paper only considers the values of *r* to be either 0 or 1. When *r* is

zero, it means that the Monarchy does not have enough revenues to pay the army and the banker. This value modifies *V* that also becomes zero. When *r* is 1, the large value of *V* remains in the payoffs of the game and the cooperation of the king becomes possible.

The payoffs

We have two players and both of them have two strategies: to cooperate or not to cooperate. In the first stage, the banker has to decide between cooperation (C) or not (NC) accepting the contract. The king knows from the beginning whether or not he is able to accomplish his promises, but it is something that the banker does not know. He does not have complete information. In fact, the king could try to cheat the banker proposing a lemon contract. The banker must have a belief about the value of *r* (or, equivalently, about whether the king will play (C) or (NC). This belief is represented by the probabilities [p] and [1 – p] attached to the strategies of the king (figure 2). He will decide after considering the probability that the king will honor the contract. In a second stage, the king has to decide between repayment (C) or not (NC), knowing what the banker did first and the game ends.

Suppose that two players decide to cooperate at the end of the game, the king will enjoy the financial services *F* provided by the banker, but he will have to pay the principal, *K*, and the interest on the loan *i*. He retains a portion g1 of the banker's monetary profits that he will have to pay in the future, once this game is over. In this case, the value that the banker has for the king, *V*, will have a positive value because he chooses to cooperate. The value of *r* will modify the value of *V*. When the king does not have enough revenues to repay the value of *r* is zero and it will also be the value of *V*. If there are enough revenues to fulfill the contracts, then *r* will be 1 and *V* will have his full value. We write the payoff of the king as

$$F - i - K + g1 + r\,V \qquad (1)$$

When the banker does not cooperate, then there is not a loan. The king loses the financial services provided by the banker but he does not have to pay the interest *i*. Now his payoff is

$$-F + i \qquad (2)$$

If the king chooses NC at the end of the game, but the banker has cooperated, then the payoff of the king includes the benefits provided by the bankers, the principal of the loan, its interests, but *V* will be negative. The payoff of the king will be

$$F + K + i - r\,V \qquad (3)$$

If the banker decides to cooperate and the king as well, the lender will get the principal, *K*, the interest, *i*, and the non-monetary rewards, *T*. However, as was explained before, the lender will not receive the whole amount of monetary profits at the end of this game. There is a debt *g1* that will be paid in the future. The payoff of the lender in this case is

$$K + i - g1 + T \quad (4)$$

In the case that the banker does not lend and the king choose to cooperate, the lender will not receive the interest and the non-monetary rewards because there was not any loan.

$$-i - T \quad (5)$$

In case that the banker lends but the king decides not repay. The banker will lose the principal of the loan, his interest, but he will enjoy the non-monetary rewards.

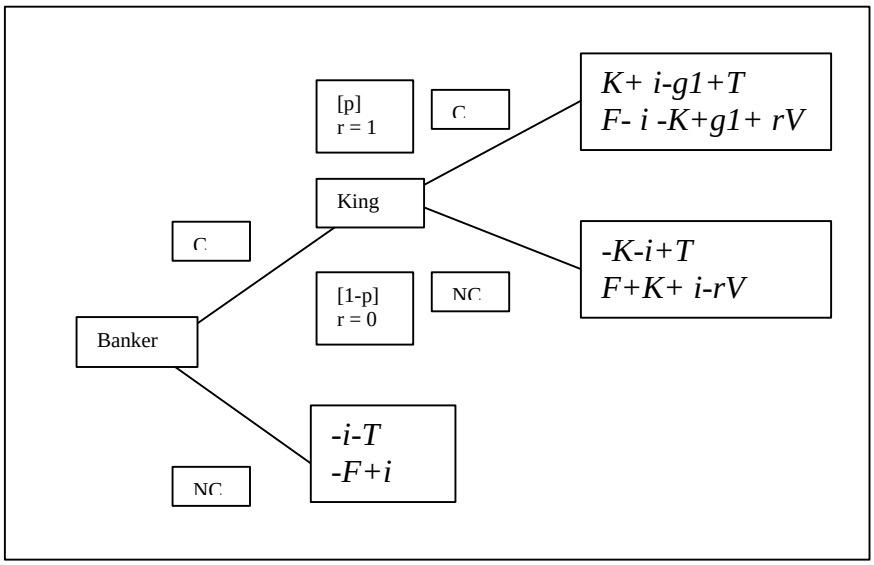
$$-K - i + T \quad (6)$$

The model shows the value of the variables to incentive cooperation from the banker. The main condition for the cooperation of the banker is (See calculation in appendix III):

$$T > (-2[p]K - 2[p]i + [p]g1 + K)/2 \quad (7)$$

This equation (7) shows that the banker will cooperate depending on the benefits offered by the king in the current game and the probability of default. In this game the banker is not looking at future payoffs from possible repeated games and he does not care about the behavior of the king in the past, he is concerned about the profits that he can get in this game and the probability that the king decides to cooperate now.

Figure 2. Game of credit[9]



In this game, the banker's beliefs play an important role to reach the equilibrium. In fact, the equilibrium consists of a strategy for each player and also the belief of the banker about the real intentions of the king because he does not have all the information before moving[10]. The king always tried to increase the confidence of the banker about him to avoid low values of [p] in his mind.

[9] The top payoff in the pair of payoffs at the end of each branch of the game tree is player 1´s, the bottom player 2´s.
[10] Kreps and Wilson (1982).

Consider the different beliefs that the banker could have about the behavior of the king (the value of [p]). If the banker is completely sure that *r* is 1, that the king is able to accomplish his promises at the end of the game, then [p] = 1. An absolute certainty that *r* is zero, then [p] = 0. This option means that the banker knows that the sovereign does not have incentives to cooperate because there are not funds enough to bargain for credit, or the credit he offers is not enough for the king's expectations. In both situations, the king will choose (NC) whatever the banker does.

The banker has a great incentive to monitor the value of *r* and *V* in order to know the probability that the king will choose to "Cooperate". Any problem of the lender to know the true intention of the king would induce him to make a mistake calculating [p]. The mistake could induce the banker to lend. If the king chooses (NC), the banker would lose the loan and the arrears. If the mistake pushed the banker to choose (NC), the banker loses the non-monetary rewards and the interests. This is a bad outcome for the king because he finishes the game without the financial services of the banker. The king will be very interested in avoiding this second kind of mistake, but not always the first one.

The model also tells us the minimum value of *V* to push the king to choose (C) considering that *r* is 1. In case that the banker chooses to cooperate, the king will also cooperate when

$$V > i + K - (g1 / 2) \qquad (8)$$

If *r* is zero, the value of *V* will have to be higher than infinite, so the king will choose to default the contract.

Consider the possibility of repeating the game. Each time the game is played, the rules are the same, but the value of variables could change, so the payoffs may be different. The final decision of both players to play will depend on the payoffs of each game. The lender will take his decision looking at his new payoffs and after calculating the probability of cooperation from the king once again.

The king may play the game with several bankers at the same time

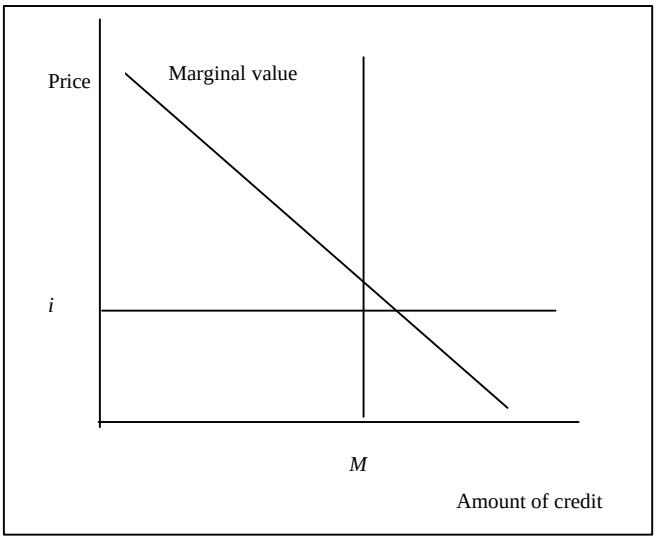
The king is looking for a certain amount of credit (M) to be able to finance his annual budget. Neither banker is able to lend the whole amount, so the king needs to borrow from several bankers at the same time in order to collect all of credit he needs.

However, when there are several bankers lending at the same time without being coordinated, we find the problem related to the decreasing marginal productivity of capital for the sovereign[11]. If the Crown has funds available at an interest rate of *i*, then the optimal sized loan is at *M*, where the marginal productivity of the last gold coin is exactly equal to the sovereign's cost of borrowing the gold coin, *i*. Raising funds to the optimal limit, at *M*, implies that the first few loans are very valuable to the sovereign, but the

[11] See details in Weingast (1997).

last few loans are not. The reason is that at *M*, the sovereign's marginal value of the last loan is exactly equal to its costs and hence has a net value of zero (figure 3).

Figure 3. The marginal productivity of loans



If the king were able to get all the credit needed from the first banker, the value of playing with the second would be zero. The only concern of the king will be to repay the debt to the first banker at the end of the game in order to play again the next time. In this case, the second banker is unnecessary for the Crown, and if the lender had decided provide any loan, the sovereign could cheat him without suffering any cost. Because the second banker could expect this behavior, the value of *V* would be zero for him and he would not cooperate.

It is important to remember that, as it was explained before, the bankers were not only offering money, but financial services. In fact, the big problem of the Monarchy was not the money but the transference of its revenues from Spain to Europe. It had many problems without the help of bankers. Furthermore, the sovereign was aware that not every lender could offer the same services to the same cities with the same easiness every year. On the other hand, no one banker had enough money and personal contacts to cover the complete amount that the Crown needed each year. Third, a banker could die and then had to be replaced as soon as possible. The sovereign also tried to keep all of the bankers because it was the only way to avoid situations where the banker could force the king to do expensive concessions.

So, to play the game with only a banker it was dangerous for the king to get credit because of the problem of market power accumulated. However, to open the door to many bankers was a bad strategy because it could decrease the confidence of the lenders in the cooperative behavior of the sovereign. They could think that the cooperation of the last one was indifferent to the Crown, and then, nobody would want to cooperate.

The solution was to play the game with many lenders at the same time, but treating each banker, as if he were the only one. The king divides the total amount of credit that he needs a year, *M*, in portions, *K*, before borrowing. He offers a portion to each banker, offering guarantees that the rest, until completing the whole amount, will be reached from others. Although there could be many bankers in the negotiations, the king makes explicit to everybody that each lender is unique and has no substitute because he needs him to complete the whole amount of credit, *M*. To show lenders that this compromise is true, the Crown has to treat to everybody in the same way, avoiding the appearance of preferential treatment in credit negotiations among them. This strategy allows the king to keep the same value of *V* for everybody in the game. In other words, the king will play only one game.

Each banker will play, thinking that he is the only one bargaining with the Monarchy, and the value of *V* does not depend on the number of bankers lending. If *V* had a positive value, it would be for everybody. On the other hand, when there are several bankers willing to lend, a banker will be more confident about the good behavior of the king in the game because it could mean that the king is able to accomplish his promises. The actions of others could be a source of information about the situation of the king in the game. It would be a way to confirm his beliefs about the values of *r* and *V*. If a banker knows that nobody wants to lend, it is going to be difficult to convince him as well.

Treating everybody in the same way means that even though the value of one banker could be less than *V* (equation 8), the king is obligated to honor his agreements if he decides to cooperate with the rest of bankers. The king will honor the contract of credit because he has to keep the value of *V* high and the same to the eyes of all lenders.

The possibility of not participating in a new game is not a credible solution for a banker when others choose to cooperate, because his profits will be always higher, cooperating when he knows that the king is going to choose (C). Leaving the credit negotiations has a high cost for the banker than remaining in the game.

A real case: the behavior of the banker with loans offering 8 per cent of interest

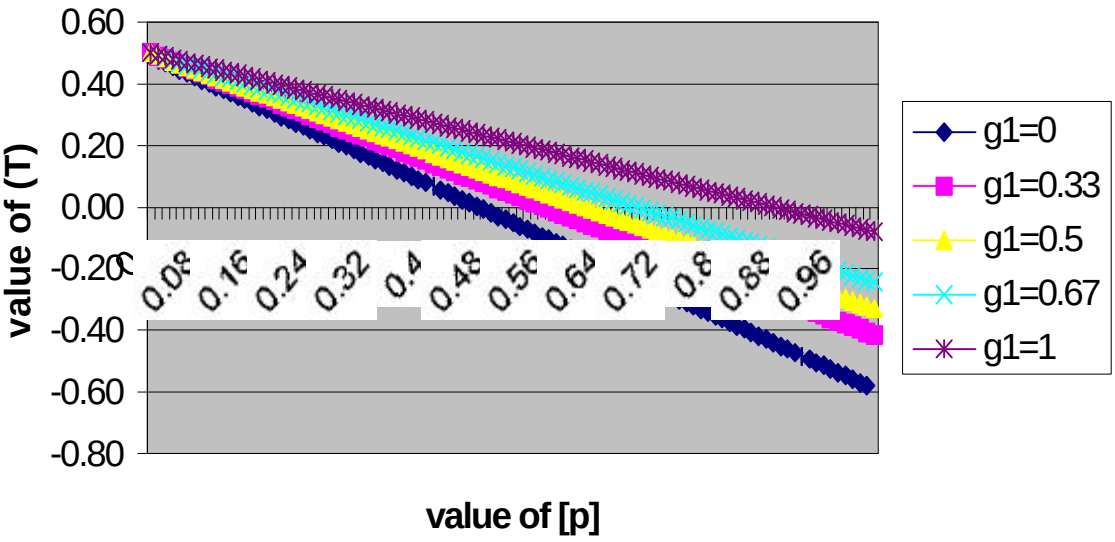
The game allows us to draw several conclusions about the expected behavior of the banker based on: (1) the probability that the king honors his promise at the end of the game (banker's beliefs), (2) the conditions offered in the contract to the banker (banker's payoffs) and (3) the benefits of cooperation for the Crown (king's payoffs).

Let us consider that the king borrows an amount from the banker offering him 8 per cent of interest. (The values of the variables will be: $K = 1$, $i = 0.08$). This interest is pretty realistic given that it was the regular interest paid by the Spanish Monarchy during the first half of seventeenth century (see figure 1). Using the equation (7), figure 3 shows the combination of values of non-monetary rewards *T* and

monetary profits retained by the king, *g1*, where the cooperation from the banker is possible for different values of [p] (see some values in appendix IV).

When the banker is convinced that there are not funds to repay, [p] is zero, the banker will cooperate only with a value of *T* higher than 0.5. It means that the king has to offer the banker a value of non-monetary rewards bigger than 50 per cent of the principal amount of the loan to get his cooperation. In this case the banker will lend just to get the non-monetary rewards present in the game and he will not care about the value of *r*.

Figure 4. Evolution of non-monetary rewards depending on the value of *g1* and [p]



If [p] is 1, the other extreme, there is no doubt that the king will honor the agreements, the banker will cooperate with *T* equal to zero (figure 4 shows negative value, but it is not possible for the king offers negative rewards). The most interesting conclusions derived from these outcomes are that the game does not need to offer non-monetary rewards when the probability that the king will honor the contracts is very high. A higher value of *g1* will be obligate to increase *T* if the king wants cooperation from the banker. In other words, if the amount of money that the banker does not receive at the end of this game grows, the non-monetary rewards have to be higher to get the cooperation from the banker.

However, the value of *g1* may not depend on the desire of the king but on his fiscal system. If it does not work fast enough to collect in one year all the revenues necessary to repay the credit, the sovereign will be forced to keep a higher value of *g1*. In this case it is important that the game offers other compensations to the banker.

Another important conclusion drawn from this model is that the banker does not need to be absolutely sure that the king is going to cooperate (the probability does not have to be 1), to choose

cooperation. The relationship between king and banker is possible with lower values of [p] and with different combinations of *T* and *g1*.

For example, when g1 is zero, the king does not retain any amount of the monetary profits of the game, and *T* is also zero, the king does not offer any non-monetary rewards to the banker; the cooperation of the banker is possible with a probability of 45 percent of not being cheated.

If the banker is only sure by 25 percent that the king will cooperate and *g1* is zero, then the contract will have to offer him at least the 23 percent of the benefits in non-monetary compensations in order to get the loan. In this same case, if the king is going to retain a 33 per cent of the payment at the end of the game (*g1* is 0.33), the non-monetary compensation will have to be more than 27 per cent.

Alternative to the banker's penalty to promote cooperation in this game

The traditional theory of sovereign debt considers that the cooperation is possible because the lender is able to impose a penalty *P* on the sovereign when he decides to renege. This penalty would be the largest credible penalty available to the lender and it could be applied by the lender or by an external institution. If the penalty is the largest credible punishment that the lender can impose on the sovereign for reneging on the loan agreement, then the sovereign will honor his loan agreement if and only if the cost to honor the contract is less or equal that the penalty[12]. If the maximum credible penalty that can be imposed on the sovereign is a function of a parameter, *P(a)*, then any change in the parameter *(a)* will affect the maximum credible loan to the sovereign.

The theory of sovereign debt distinguishes two problems in the credibility of the penalty. First, Bulow and Rogoff (1989) show that in certain circumstances the lender has limits to punish in the event that the sovereign reneges, because the penalty hurts him as well as the sovereign. Second, there is a problem of credibility in the penalty when there are multiple or potential lenders. With many lenders, a boycott after a default potentially becomes difficult to enforce (Greif, Milgrom and Weingast 1994). It is necessary that lenders coordinate their actions and prevents defection from a credit boycott (Greif 1993). Without coordination the penalty will not be credible and the lender will never cooperate in the game.

This paper argues that a penalty is not necessary to explain why several lenders may accept to cooperate with the sovereign, even when they are not able to coordinate their actions to punish him. The key element of the relationship is not the penalty but the banker's beliefs about the value that he has for the sovereign *V*, and the existence of enough revenues, *r*, to honor the credit contracts at the end of each game.

When the game is being played with different lenders at the same time, the lender may observe the actions of the king with respect to other bankers in order to figure out which is the value of *V* with respect to him. Any action of the sovereign against a lender as, for example, delaying a payment, could be a signal

[12] Weingast (1997), p. The king will cooperate when the penalty is bigger than the payment: $P > K (1 + i)$

for the bankers. This signal can change their beliefs about the game. For example, it could mean that r probably is zero. Then, the lenders could expect the same kind of action against them and it will be difficult for the king to get their cooperation. It could explain why, many times, the king pays his debts and did not cheat, even though the value of the credit provided by some lenders is zero or negative for him. And it also explains why the king decides to end the game suspending all payments to everybody instead of doing it only to some lenders. He assumes that after reneging on one contract, it will be a signal of danger for the balance of the contracts and it will mean that the king distinguish among important and less important bankers. To bargain for a new credit again will be more difficult after cheating one banker than after cheating all of them.

Conclusions of the model

The model shows some conclusions about the relationship between the king and the banker.

(1) Credit is possible without the ability of lenders to coordinate a collective punishment against the sovereign. In fact, the decision of the king does not depend on what the banker may do, but on exogenous variables, called r and V in this model. The first is related to the revenues of the Monarchy to repay the contract of credit and the second is linked to the value that the banker has for the king in each game. The king will try to keep secret any information about the real value of both variables because they reflect the strategy that he will choose in the game.

(2) An exogenous variable, the amount of revenues that the king has available each year to bargain with the bankers, r, modifies the payoffs of the king. This variable depends on the current income and debt of the Monarchy. A huge amount of debt could make the cooperation impossible even though the income of the Monarchy does not change. In this case, the value of $r = 0$ (appendix II). It means that the king will not be interested in cooperating when the debt is too high because he cannot get the credit that he needs. This outcome has been called bankruptcy in the literature.

(3) Bankruptcies were not an obstacle to get cooperation even from the same banker because the banker does not choose his strategy considering that the king has cheated once and he could do it again, but considering his current payoffs. His decision is taken considering the current value of the main variables of the game. The banker has to monitor the value that he has for the king, V, and the revenues of the king, r, before choosing (C).

(4) The king may play this game with several bankers at the same time in order to increase the amount of credit available and to reduce the potential market power of only one

banker playing. The condition is that the king has to treat all bankers in the same way, without making distinctions. The game has to be played with just one banker as it is in the model. Then, the value of *V* has to be the same for everybody. When the king decides to cooperate, he will do it with all bankers. The same happens if he chooses not cooperate.

(5) Beliefs of the banker are an important element of this game to reach cooperation. It is important for the king not only to have funds, but also to show the lenders that they really exist. When it is difficult to get information about the real value of *r*, to know that other bankers are going to lend improves the expectations of other bankers in the game. It could explain why some bankers go together many times to sign on the "*asientos*". It did not mean that they are a cartel but it is the way to increase their confidence about the future action of the king in the game. The king helps the bankers to act in this way, and it does not mean either that he is helping them to be organized as a cartel.

(6) The model shows that when there are several bankers playing, because everybody has the same payoffs, when a banker decides to cooperate, the others will make the same decision. It is not a credible banker's strategy avoiding cooperation when the banker's belief is that the king will cooperate, because his payoff is higher lending. However, it could happen that after several games, a banker is not in condition to lend again or that he died.

(7) The game shows the importance of the non-monetary rewards in order to get cooperation from the banker. They allow a cooperative outcome even though the banker is not 100 percent sure that the king is going to honor the contracts.

III. The behavior of the Spanish Monarchy and his bankers in the credit negotiations

Credit was possible without the ability of the lenders to coordinate a collective punishment

The Spanish Monarchy was successful in convincing many merchant-bankers to participate in its financial system, even when it was risky for them. German bankers were the most important financiers during the Charles I's reign. After the first bankruptcy in 1557, many of them left the negotiations, permitting the arrival of more Genoese bankers[13], but the Fugger remained in Spain working with the

[13] This group became a master of the financial system of the Habsburg dynasty. The German bankers had participated to a large extent in public financing with their own capital, unlike the Genoese, who had not committed themselves to the same extent, and had participated using outsiders´ deposits. As a result, the Genoese withstood the different crisis over time much better. Van der Wee (1977), p. 371

Crown until the 1640s. Genoese and German were not the only ones. It also is possible to find other Italians, Portuguese and Castilians.

Many bankers came from the same city or country but they were always rivals. The lack of collective action against the Crown was clearly shown before and after each bankruptcy. An example of non-cooperative behavior was documented in 1586. Stefano Doria found that Lorenzo Spinola had been falsifying accounting books with the aid of a royal official. He did that because he had accepted a secret agreement from the Council of Finance to reduce the Crown's debt in exchange for being paid with good currency. It was against the interests of the rest of the Genoese bankers because they had decided to deal together with the Council in order to reach the best possible agreement after the last bankruptcy. The Crown had recognized the total amount of its old debt because the financers had accepted compensation with bad quality payments, but some of the Genoese bankers, like Lorenzo, broke their agreement[14]. Another example of this independent behavior was the lack of collective reaction among the Portuguese bankers against the king when the Inquisition arrested some of them during the 1630´s.

Coordination faced a major obstacle: contract ambiguities and asymmetric information between lenders. Their cultural and geographical diversity made their association almost impossible. Furthermore, the different bankers had distinct incentives even in the same group. Players had personal economic goals and they were in a permanent competition amongst themselves. The free-rider problem was always present. Information asymmetry, slow communication, different networks and kind of businesses implied a very different interpretation of facts among financiers. Without an organization that coordinated responses, it was not likely that all the bankers would have responded together against the king after the abuse of any one banker. However, it does not mean that the king's actions did not influence their beliefs about the game. Any action of the king against one of the bankers could modify the willingness of the lender to lend, as it was described in the model.

The "credit rationing" issue of sovereign debt theory implies that if the ceiling of credit depends on a penalty, the sovereign has to give up more power to its lender in order to increase the amount of credit. The model presented in this paper tries to explain that cooperation is possible without any penalty in the hands of the lender. When the equilibrium is possible without giving more power to the lender, the sovereign does not need to be worried about the power of the banker to decide the price of credit. It happened in the case of the Spanish Monarchy several times.

The Crown was not indifferent to the potential threat from a powerful cartel of bankers. To avoid this threat, the Council of Finance looked always for new bankers, trying to open the negotiation to more lenders. The Genoese bankers were the bigger and more efficient group, but not the only one.

[14] Canosa (1998), p. 167.

Philip II was convinced of the benefits of that plurality when he invited some Castilian bankers in 1575 to come to the Court to lend money[15]. Spanish bankers like Pedro de Maluenda, Simón Ruiz, Diego Vitoria, among many others, found it attractive to enter in the credit negotiations. They could not offer the same amounts of money lent by the Italians, even when the Monarchy offered them very good conditions in the contracts. Moreover, their connections were available only in a small number of European cities[16]. In spite of these drawbacks, the Monarchy supported them in the negotiations. With this action, the king wanted to limit the strong power that the Genoese had.

Philip IV tried to do the same with the Portuguese. Genoese bankers were putting up many obstacles for accepting "*asientos*" after 1621. The Council had to accept many of their expensive demands and the reputation of the Crown suffered when the royal officials had problems in carrying them out. In 1626 a group of Portuguese, Manuel Rodríguez de Elvas, Nuño Díaz de Brito, Manuel de Paz, Simón Suárez, and Juan Núñez Saravia were invited to sign an *asiento* in Madrid to lend 400.000 escudos[17]. Philip IV recognized that this contract had been signed "in order to increase the number of bankers, and also to encourage my subjects from Portugal to participate in this kind of *asientos*"[18].

Many times the new bankers did not lend money more cheaply than the veterans because the more efficient agents were already working for the Crown. That higher cost for the same or lower quality of financial services was justified by the intent of reducing the demand of expensive conditions in new *asientos* from formers bankers. If they saw how a lot of non-monetary benefits of "*asientos*" went to others, it could have been a strong incentive to reduce their exigencies. The Council of Finance preferred to pay a higher cost in the *asiento* of 400.000 escudos because: "the value of having Portuguese in the Court to deal with them is higher than the price of this *asiento*"[19].

Although the Portuguese were important in the financial system of Spain, they were not the only group used by the Crown to increase the number of bankers during the Philip IV's reign. In 1633, the Council of Finance was worried about the consequences of losing businessmen like Simón Suárez and Marcos Fernández. In its opinion, "it would be convenient to cheer up the bankers that we have while we look for new ones. This is the way to have enough bankers available to borrow and also compete among each other, with the outcome that we will get better *asientos*"[20]. In 1638 the Crown, with a great deal of exasperation, was looking for lenders in several European cities. The goal was "shutting out the necessity of

[15] Ruiz Martin (1990a), p. 19.
[16] Ruiz Martín (1990a), p. 19. Lapeyre (1953). It has been shown that they just were able to lend small amounts of money, and usually inside of Castile.
[17] AGS CJH 621. Consulta, August 17, 1626. At least since 1622 there were negotiations with Portuguese merchant-bankers. Boyajian (1983), p. 17.
[18] AGS CJH 656. Cédula, January 31, 1627.
[19] AGS CJH 621. Consulta, August 17, 1626.
[20] AGS CJH 701. Consulta, November 12, 1633.

the Genoese bankers for *asientos* in all places"[21]. The Crown looked for new bankers in Antwerp in the 1630´s. The Portuguese had the best contacts there, but the royal officials also found people from Milan, Naples and Florence willing to lend[22].

Bankruptcies were not an obstacle to repeat the game

The model shows that a possible obstacle to get cooperation in the game of credit is the inability of the king to honor his agreements because r becomes zero or V too much low. When the banker is completely sure that $r = 0$, the equilibrium in the game is (NC, NC), unless the king offers a value of T higher than 0.5. Only when the king gets new funds again and the banker notes it, the king will be able to obtain new credits with smaller values of V.

In order to improve a bad financial situation, the Spanish Monarchy had two options. It could increase his revenues or reduce his debt (see appendix II). The king could get more revenues without ending the cooperative strategy with the bankers in the game; it just depended on the ability of the Monarchy to increase the fiscal pressure in the kingdom or to create new taxes. However, any increase of debt after several games played would reduce the revenues available to bargain new credits. It would require a renegotiation of the old debts with the bankers and it means to break the promises made in the contracts about the payments of *g1* in the future.

The Spanish Monarchy used the second option many times. A bankruptcy was a mechanism to recover part of the income blocked by old credit negotiations when a new game with the bankers became impossible. The Council of Finance declared bankruptcy several times: 1557, 1560, 1575, 1596, 1607, 1627, 1647, 1652, and 1662. Some bankruptcies arrived as a consequence of periods where there were not more funds to bargain ($r = 0$). Others were provoked by the problems of some bankers to estimate the real value of r.

These episodes were an important mechanism to improve the financial situation of the Crown. They were not wholesale repudiations of obligations, but a rescheduling of debts[23]. Bankruptcies reduced the Crown's debts in the short-run, delaying the payments for more time than had been settled in the "*asientos*", or by giving up other kinds of compensations more convenient for the king[24].

The agreement settled with the bankers after each bankruptcy was called *Medio General*. It allowed the Monarchy to convert the short-term debt into a long-term debt, which took the form of public debt (*juros*). Many bankers had strong reasons to accept these agreements because they needed to recover quickly

[21] AGS E 3347. Letter by Conde de Siruela, Génova, February 15, 1638.
[22] Ruiz Martin (1990b), pp. 60-61.
[23] Thompson (1994), p. 160.
[24] In part, the financial problems of Fugger in the 30´s were caused by the accumulation of arrears to more than a million ducats, especially from the "Millones", one of the best payments that a banker could receive. The problem was that the Crown used the revenue to promise more payments than the money that could be collected from it.

as much as money they could in order to save their reputation in the fairs and other businesses, but they were unable to enter again in new negotiations.

With bankruptcies, the threat of default disappeared for an indeterminate number of years at the credit negotiations. Everybody knew the huge incentives of the Crown to play (the value of V was high as before) and the cooperation seemed very safe again because there were revenues available ($r = 1$).

An example of how the beliefs of the bankers about the future profits in the game changed after a bankruptcy is shown by what happened after the suspension of payments in 1596. The Monarchy was able to borrow again from the group of bankers trapped in the default after the *Medio General* had been signed. They provided 4.5 million escudos starting in January 1598 in Antwerp, Dunkirk, Lille and Namur[25]. This *Medio General* was a good deal for the bankers and many of them could recover a great part of their old debts, so they entered again into the credit negotiations with the Spanish Monarchy.

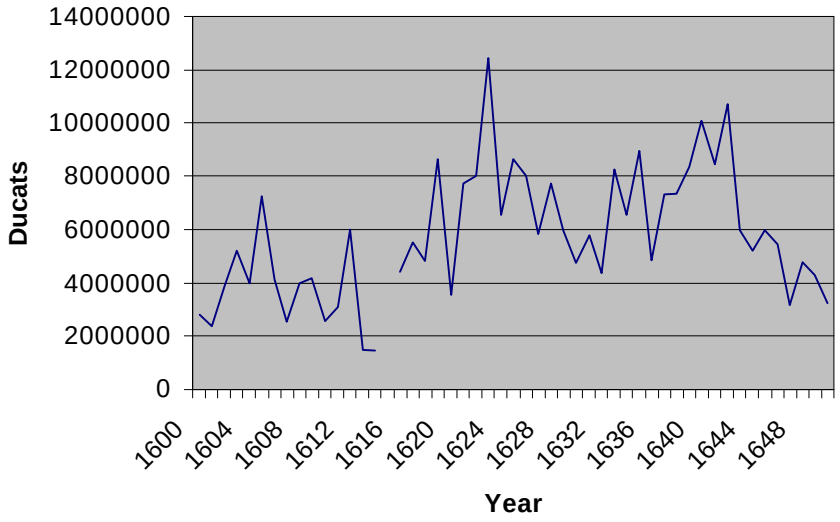
A bankruptcy served to reduce uncertainty in the credit game, but it came at a cost. This mechanism pushed some bankers out of business, because they received public debt instead of cash. They were not able to lend again even if they wanted to do it. It was a bad outcome not only for those affected bankers, but also for the Monarchy. If the king repeated the suspension of payments many times, he could lose all his bankers, something that the king did not want. The king of Spain only used the bankruptcies in very extreme cases, when the bankers did not want to lend again and there were no other options to increase the revenues.

The success of bankruptcy to repeat the game also requires new bankers or extra cash available. Meanwhile, the new game starts. The king would not be able to renegotiate the old debt in the *Medio General* if the Monarchy did not have a credible alternative to provide credit for some period. An example of this happened during the suspension of payments of 1596. Right away after the bankruptcy, the Monarchy excluded the Fugger in order to get their credit during the hard year of negotiations with the rest of bankers affected by the default. The Fugger provided one million escudos in Milan in July 1597[26]. They were the most important creditors until the *Medio General* of february 1598. The American silver of the king also played a similar role during the times the negotiations were blocked[27].

Other examples show that new bankers were invited in after every bankruptcy. The 1557 bankruptcy was the real entry of Genoese, the 1575 the Monarchy invited the Castilian and tried to create their own network of factors in Europe; the bankruptcy of 1627 was the moment when the Portuguese arrived at the finances of Castile. And in 1647 the king broke the game to expel the old Portuguese bankers and to introduce a new group of Genoese financiers and Portuguese merchants.

[25] Sanz Ayan (1999), p. 90.
[26] Sanz Ayan (1999), p. 87.
[27] Álvarez Nogal (1997a).

Figure 5. Value of "*Asientos*" lent by bankers to the Spanish Monarchy, 1600-1650.



Source: Gelabert (1999), p. 231.

Despite the frequency of the bankruptcies, the Crown always reached an agreement with its creditors very quickly, and they resumed their financial services immediately afterward. The trend shown by the annual amount of the *asientos* contracted during the period 1598-1650 shows the success of the Crown in bargaining with the bankers even when there were regular defaults (figure 5 and appendix V).

Figure 5 suggests that the bankruptcies did not alter the ability of the Monarchy to borrow because they were part of the game. On the other hand, the bankers did not make irrational decisions when they decided to restore their credit lines. As history shows, they were able to cooperate with the king in a stable way for many years before the next suspension of payments took place. The willingness-to-pay of the king was credible and real at the same time, doing the cooperation profitable for both parties while it lasted.

After a suspension of payments, the bankers had to choose between leaving the game permanently and thereby losing all of their investments, or finding a solution to recover the debt in a long-run horizon, beginning a new game with similar characteristics. If the Crown offered that possibility, the value of a new game for the bankers would be biggest because the risk of a new bankruptcy would be remote. This is the explanation of why, after breaking the game, the bankers less affected by the default could choose to play again as long as they had a way to get their old arrears.

Non-monetary rewards was a important part of the game

Non-monetary rewards, *T*, were an important element of this game of credit, which enabled the Spanish Monarchy to borrow in the short-term. These rewards explain why risk-averse individuals would choose to play this game. This mechanism permitted the players to link the actions inside the credit

relationship with other different social and economic spheres outside the game, where the Crown and bankers were also present. Also spreading out the consequences of their liability in the "*asientos*" to a more extensive relationship, the bankers could increase their confidence and the present value of playing the credit game[28].

The bankers would play to get other benefits not easily quantifiable, like social status, power, prestige, political influence, doors opening to other businesses, etc. The economic sociology calls attention to the mixture of economic and social motives that people pursue while making economic decisions[29]. This idea is related to people pursuing multiple purposes simultaneously in intersecting social formations. People want sociability and hope to be liked, approved and admired by others. Bankers and the king of Spain had not only economic, but also social needs in their "objective utility functions". All those benefits offered by Madrid as center of a great political and economic empire, could be more satisfying to the bankers than the amount of money earned on their loans by the interest, *i*, promised in their contracts.

A very important characteristic of this variable is that many of the non-monetary benefits were enjoyed right after bankers started to play, and they could not be confiscated by a bankruptcy. It implies that *T* did not represent cumulative benefits, but current benefits which bankers readily used in each period.

We can test the model of this paper using the banker's profits reported for some scholars from controlling the American precious metals of the Spanish Monarchy and the main fairs of payments in Europe at the same time[30]. For example, Boyajian asserts the profits from bullion export were greater than the profits from interest and exchange in the contracts. Profits from silver exports have been calculated between 11 and 25 percent during Philip IV's reign. It was higher than the percentage promised to the bankers as interests on the loans[31]. We can consider these profits as non-monetary rewards obtained by the banker from the cooperation with the Spanish Monarchy, because the king did not have to pay it.

Figure 4 and appendix IV show that when the value of *T* is a 25 percent of the loan, the interest of the loan is 8 percent and the king delays a 33 percent of the total payoff of the banker for next years (the value of *g1*), the sovereign will be able to get credit from his banker when he is 60 percent sure that the king will repay. A wide margin of uncertainty is not an obstacle to get cooperation from the banker. Historical evidence shows that these values were common in the credit contracts during the seventeenth century. Here we are just considering *T* as the benefits from exporting silver to Europe through the fairs of Italy because it

[28] Other authors have described similar mechanisms in other situations. Conklin (1998) has described how three institutional circumstances bound the Spanish Crown to repay domestic holders of public debt (juros). Zerbe and Anderson (2001) have shown that cultural matters are essential in solving collective action problems in the California gold fields.
[29] Granovetter 2001.
[30] Carande (1968) showed the close relationship between "asientos" and American precious metals during the Carlos I's reign. Alvarez Nogal (1997b) did the same for Philip IV's reign.
[31] Boyajian (1983), p. 171. Ghilino (1996).

is easier to calculate, but the value of *T* also would include other economic businesses in Castile and the social benefits of being in Madrid as banker to the King of Spain.

It is important to note that the banker maintained all these profits only while he was involved in the credit negotiations. Any problem of a banker to maintain his cooperation with the Monarchy in the credit negotiations could damage his position in Madrid and the rest of his businesses. A bankruptcy was always a great threat for the banker because a bad renegotiation of the debt could leave him unable to restore its financial services. Then, he would lose the privileges that he enjoyed in the Castile. The fear of being unable to continue in the credit negotiations with the king kept the bankers from making bad decisions lending to the Monarchy and it was an incentive to compete with other bankers. Thus, non-monetary rewards cannot explain completely why the lender decided to provide credit and they were not enough compensation to assert that bankruptcies were not a concern for the bankers, but the non-monetary rewards provided several incentives to take certain risks because they altered the banker's payoffs of the game.

At the same time, these social relationships might be the best mechanism for sharing information among individuals and business inside the game of credit. As a consequence, living in the Court was an essential part of it. On one hand, it gave lenders the information necessary to improve their expectations about the behavior of others in the game. It was the main source to improve their beliefs about the game. On the other hand, the king used the presence of bankers in Madrid to establish with them a close relationship as an incentive for their participation in the game. A close friendship with the king could be worthy enough for a banker to lend[32].

There were two attractive reasons why bankers were interested in dealing with the Habsburg dynasty in Spain. The first was the opportunity to obtain privileges in markets that were regulated by the Crown[33]. Bargaining with the Crown was the key for opening the door to other less risky business ventures in Castile. For instance, the Fugger obtained the administration of two important rents: Almaden and the revenues from the "Órdenes Militares"[34]. Julio Cesar Scazuola, manager of a Fugger firm in Castile in the seventeenth century, became "*Tesorero General de la Santa Cruzada*"[35], an administrative position that controlled a substantial part of Castile's silver circulation. The Portuguese in the seventeenth century were known for their capacity to control the Castilian fiscal system, especially customs[36]. Moreover, they also had a huge interest in trade with American and Asian colonies[37]. Portuguese merchants imported clothes, grain

[32] Frequent economic interactions among the same individuals gave rise to "friendliness", and satisfaction from friendliness motivates them to interact further, socially as well as economically (Homans, 1950).
[33] Carande (1945-67) vol. 3, pp. 386, 419, 458 y 467. Ulloa (1963), pp. 161, 229-232, 250, 267. Both authors give examples of royal monopolies in Castile controlled by Genoese during the reigns of Charles I and Philip II. In Sicilia: Trasselli (1978), p. 202. It is also possible to observe the same behavior in the Austria Monarchy. Pickl (1986), p. 155.
[34] Matilla (1958).
[35] Domínguez Ortiz (1960), p. 140
[36] Israel (1990), pp. 355-417.
[37] Serrrano (1994). Boyajian (1993).

and wood from Northern-Europe, and exported wool, fruit and oil from Castile. They obtained licenses to enter in these protected markets because they lent money to the Monarchy.

The second reason to cooperate with the Spanish Monarchy was that for many years, the king of Spain was the owner of huge amounts of precious metals and controlled part of their production and transference throughout Europe. These resources probably constituted the Genoese' primary motivation in risking their capital in the "*asientos*".

The gold-silver ratio and the silver-copper ratio likewise led to considerable strain on the local economy during the sixteenth and seventeenth centuries[38]. The goal of many bankers was to control the manner in which silver arrived, and for many years Castile was the main harbor of substantial amounts. It was impossible to have access to the Castilian silver markets and not participate in the financial system of the Monarchy, especially when the king was looking for credit and bankers desperately.

A good example of the lender's interest in controlling Spanish silver was the crisis suffered by the Genoese when Philip II cut his cooperation with them temporarily. For months, the Council of Finance sent money to Flanders using other methods, far away from the markets controlled by Genoese bankers[39]. It was bad for the king, but also for the bankers.

Playing with many bankers. The Monarchy treated all of them separately

The king played the game of credit with many bankers at the same time because no one was able to provide all the credit that the Monarchy needed. This implies that the king had to facilitate the confidence of each banker in the game. For that reason, the sovereign permitted the information about the credit negotiations to become public knowledge. The king also invited several bankers to the credit negotiations at the same time, discussing the amount of credit that he needed with them as a group and dividing among them the total amount. Each one will provide his portion individually, knowing what the others were doing.

The most important negotiations about the credit in Madrid every year were the *Provisiones Generales*. They took place in the Palace of the king at the end of each year. All bankers were invited for the Council of Finance to know the amount of money that the king needed. The negotiations could be maintained individually or in groups, but everybody was aware about the conditions and the success of others. This information was provided many times for the own Council of Finance. He was very interested to celebrate in public that a banker or a group of bankers had decided to sign the *asientos*.

To bargain with the king as a group had advantages. Sometimes, in order to reinforce their position in front of the king, the bankers bargained with the Crown and signed an *asiento* together, even

[38] The enormous but unequal expansion of the production of precious metals in this period widened opportunities for speculating on the difference between the official mint ratios and the market value of precious metals. In the Middle East, and especially in the Far East, silver was valued much more highly than gold was in Western Europe. Thus, the western merchant gained from paying for his purchases in the East using silver[38].

[39] Ruiz Martín (1998), p. 404. The new fairs of Piacenza were almost blocked.

when each one had absolute and individual liability about his own part of the contract. It means that when a banker was not able to provide the amount promised, the rest of bankers were not responsible for it. In fact, they were not obligated to increase their quota to cover the failure of their colleague.

Bargaining together was attractive for the banker because it provided more information about the conditions offered by the king to other bankers and about what was going on in the credit negotiations. In this sense, it is possible to observe signals of temporary cooperation among bankers. This coordination was easier when they were from the same city or had cultural roots in common, but even in these cases, they were always competitors.

This common strategy had one of its better moments between 1598 and 1609 among the Genoese group, when these financiers signed an 88 per cent of the total number of "*asientos*"[40]. However, it does not mean that the Monarchy was bargaining with just a group because they had to compete with the bankers that were providing the balance of 12 percent of the credit.

Years later, especially between 1621 and 1626, it is also possible to observe among the Genoese group a strong capacity to bargain "*asientos*" collectively. For example, when the Crown settled the conditions of credit in 1626, the bankers said that "they would join, they would deliberate about it together and afterwards would offer a final answer"[41]. Finally, they rejected the initial proposition explaining their reasons and conditions. This cooperation among bankers was common only during the process of negotiation, not after the money had been advanced.

One could argue that the king might have thought that working with many lenders, cheating some of them, the Monarchy would not suffer any consequence the next time because there would be other bankers available. However, this behavior would spread among the bankers the belief that the sovereign has only interest in collaborating with the most important bankers. Problems among the bankers to identify who was more or less important would have spread the belief that everybody could be cheated. If more lenders were playing, it created more uncertainty in the game, more probability to be cheated and less willingness to enter into the game.

To avoid this bad outcome, the Spanish Monarchy played the game with each banker, as if each banker was the only one lending to the Crown. Much historical evidence shows this kind of behavior in the actions of the Council of Finance. The goal was retain them as friends and allies as many time as it was possible. Then, the amount of credit lent by a banker was not related to his importance in the game of credit. In fact, some bankers lent less money than others at the beginning of their cooperation with the Monarchy, and after some years (after some games) they became more and more important in the financial system of Spain.

[40] Doria (1986), p. 69.
[41] AGS CJH 621, Consulta, July 12, 1626.

An example of this is the way that bankruptcies took place. When the value of *r* became zero and the king had decided to renege, many times the king had enough money to pay some bankers, and he could have maintained the cooperation with the most important group, defaulting the debt of the rest. However, following that strategy would change the expectations of all lenders about the value of *V* in case the game would be repeated again. It was very difficult for the king to pay only some bankers and default the rest without affecting the future expectations of players. Doing that would mean that the king was distinguishing between friends and enemies. As explained above, in order to avoid uncertainty among the bankers, it was very important that the value of *V* remained high and the same for all of them.

For that reason, the procedure in each bankruptcy was always to default first all payments to all bankers. After that, the Crown and lenders negotiated an agreement, called *Medio General*, to resolve their differences about old debts. The agreement fixed the amount of debt that the king would pay in the future and the way the debt would be paid. In this negotiation, already outside of the game of credit, the Monarchy could treat each banker in a different way, depending on his importance and value for the next possible games.

Table 5. *Asientos*, amount promised and real payments with the treasure arrived in 1629 (ducats).

Hombre de negocios	Date of the *asiento*	*Asiento*	Promised	Payment	%
Gerónimo Fugger	08/02/1629	780.000	150.000	61.500	41
Herederos Marcos y Cristóbal	24/01/1629	743.492	50.000	20.500	41
Octavio Centurione	08/02/1629	450.000	100.000	41.000	41
Lelio Imvrea	08/02/1629	390.000	80.000	32.800	41
Agustín Giustiniani	19/02/1629	390.000	80.000	32.800	41
Nuño Díaz Méndez	08/02/1629	253.418	50.000	20.500	41
Simón Suárez	23/03/1629	218.333	50.000	19.885	39,77
Duarte Fernández	23/03/1629	218.333	50.000	19.885	39,77
Manuel de Paz	23/03/1629	218.333	50.000	19.885	39,77
Juan Núñez Saravia	23/03/1629	240.000	52.000	21.320	41
Juan Gerónimo Spinola	05/04/1629	61.000	2.500	1.025	41
Total		3.962.909	714.500	291.100	40

Source: Archivo General de Indias. Contaduría. Legajo 362A-2.

Other examples of how the Monarchy treated all bankers in the same way was the mechanism used to pay debts when the king did not have enough money for everybody in some specific fiscal offices. In those cases, everybody received the same proportion according the amount initially advanced.

The *Casa de la Contratación* in Seville was one of the offices with more pending debts during the seventeenth century. The American treasure arrived there every year and all bankers wanted a share, but the problem was that the Crown promised more payments than the amount of money arrived on the fleets. Each time this happened, the Council of Finance ordered to pay to each banker the same proportion of money with respect to the amount promised in the contract by the king. The smaller banker received the same proportion as the most important financier.

One of the many examples of this behavior was the distribution of the silver that arrived in the fleet of General Larraspuru on April 1629 (table 5). In the *asientos* the king had promised to give 714.500

ducats to the bankers, but after paying the mercury to the Fugger and reserving something for the ordinary expenses of the royal administration, the Crown only had 291.100 ducats available. Instead of paying first the most important bankers, Gerónimo Fugger and Octavio Centurione, the Monarchy divided the money among all the bankers, paying each one the same proportion, by 41 percent, of the amount initially promised.

Beliefs of the banker are important to play the game

The model shows that when the bankers believe that *r* is zero they will not cooperate. This strategy describes many critical moments just before the bankruptcies[42]. For example, in 1626 the bankers did not want to lend more money before getting their promised American precious metals, but the king had decided to use this revenue to bargain for new "*asientos*" in the next months. He did not have other funds available at that time[43]. In the summer of 1626, the Council of Finance expressed its concerns for "the huge problems surged in order to settle out the final '*asiento de Provisiones Generales*' (…), but even after getting it, more money was needed for Flanders, the navy, the all frontiers, forts…"[44].

The situation in Flanders was critical because even the "*asientos*" that had signed, were not being carried out. This action from the bankers was terrible for the Crown because it was impossible to replace that amount of money in the short-run. It showed that the bankers avoided lending because they knew the problems of the Crown to pay the old debt and the new credits. There were high probabilities that $r = 0$. The solution to this disagreement was a full suspension of payments from the king some months later, in January 1627.

The critical role of *r* in the game makes it important for the king not only to have revenues, but also to show the lenders that the funds really exist. The Monarchy realized many times the importance of the banker's beliefs about the value of *r* in order to get new credits. Those beliefs could be modified depending on many different factors.

The banker could monitor the value of *r* looking at the amount of debt. Any problem to honor the debt would indicate to the lender that the king would have problems to honor the next credit contracts and he will be more reluctant to lend again. A situation like this happened during the 1630´s. A series of delays in compensation from the Crown caused the bankers to freeze their credit in Europe until the money promised by the sovereign arrived in Genoa[45]. In this case, the lender could also delay the provision of credit according to the contract signed without being punished by the king[46]. For months, the Spanish

[42] Alvarez Nogal (1997a), pp. 123-144.
[43] AGS CJH 622. Consulta, December 10, 1626
[44] AGS CJH 622. Consulta, July 1626.
[45] AGS E 3597. Letter by Juan de Eraso, July 5, 1652.
[46] In many credit contracts, the bankers were permitted to punish the king immediately, using a clause of suspension: the option to suspend owed payments if the banker would not receive his compensations on time. It could be applied

government could not obtain credit, which caused great damage to the Monarchy, but because they were temporary problems, a bankruptcy was not necessary.

The Council of Finance was always aware that a delay of payments affects the banker's belief about the ability of the king to honor the contract. It could bring a reduction of credit and more obstacles to borrowing: "when (the bankers) do not receive compensations easily and satisfactorily, but delay of payments in this kind of business, not only brings discredit to the king, but it cost money because the businessmen avoided making new contracts"[47].

As the model predicts, old debts are not decisive to constrain the behavior of the banker. The bankruptcy of 1626 is a good example. Although the bankers knew the high probabilities that the king defaulted if they objected to lend again, no banker wanted to provide more credit that year. When the bankers were afraid about lending more money, the Crown borrowed from them using these terms: "what sane creditor did not try to maintain his debtor in order to receive the debited payments from him? For that, conserving the health of the king is the way to conserve your own health"[48]. However, there was not an agreement and in January 1627 the king decreed a suspension of payments.

The Crown knew that it was important to keep its promises today in order to have more credit tomorrow. The Council of Finance tried to explain it to the king as follows: "The current bankers´ strength in providing *asientos* would be bigger if they received their arrears. The spirit and courage of a banker in order to negotiate a new credit is very different depending on whether he got all the money that was promised to him in his last credit, especially because he knows that he will have to pay in the short-run, but he is not sure when he will be paid"[49].

The model shows that the threat of a banker to avoid a new game is not credible because his payoff will be always higher if he plays again whenever r is 1. The Monarchy knew it perfectly. Some time after the death of Lelio Invrea, the Council of Finance wanted to start dealing again with this family. The Council was convinced in 1643 that if it could get new credit from them, this family "would be hooked again in the "*asientos*" for the future"[50].

To avoid cooperation is not a credible option for the banker but he could reduce the amount of money that he lends to the Monarchy. If the king decides to delay the old debt payments, the lender will continue cooperating in the game but reducing gradually the amount of credit he provides to the king. Remaining in the game the banker will receive his arrears and will reduce the possible damage of being surprised by an unexpected end of the game.

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before the banker had accrued all his money. In this case, the bankers blocked the money they had to send to the armies. It did not imply a breach and hence they could not be penalized.

[47] AGS CJH 621. Consulta, August 30, 1626.

[48] AGS CJH 621. Consulta, July 12, 1626.

[49] AGS CJH 714. Consulta August 8, 1633.

[50] AGS CJH 852. Consulta, March 24, 1643.

Historical evidence shows that the bankers continued lending money even though they were not receiving the payments promised, but reducing the amounts of their credits[51]. The credit provided by Duarte Fernández, one of the most important bankers of Philip IV, is another example of this behavior. He continued lending money even when the king did not pay him the amount promised for several years. The first and second column of table 6 shows the amount of credit signed in the contract and the amount really provided by the banker. The third column represents the amount of debt that the sovereign did not pay him.

Table 6. Accumulation of the Crown´s Obligations to Duarte Fernandez, 1626-1647 (ducats).

Year	Principal of contracts	Actual payments	Crown´s obligations that was not paid
1626	66.667	66.667	
1627	166.812	184.975	
1628	219.048	228.574	
1629	301.667	201.300	
1630	325.000	194.315	
1631	411.250	363.648	
1632	440.000	368.488	
1633	368.167	297.610	
1634	559.284	478.970	
1635	873.000	652.863	28.016
1636	1.327.371	1.282.396	
1637	1.455.000	1.217.835	
1638	1.327.200	1.042.699	
1639	1.237.600	1.029.934	75.253
1640	1.241.050	1.050.711	187.680
1641	1.038.425	981.103	118.773
1642	1.232.667	981.675	147.786
1643	700.000	336.809	221.226
1644	554.000	370.168	138.720
1645	695.000	527.997	322.774
1646	813.237	670.490	562.134
1647	450.000	285.263	241.173
Total	15.802.445	12.814.490	2.043.535

Source: Boyajian (1982), Appendix H, pp. 214-215.

Should the banker refuse to extend the Monarchy a new credit? Then he would no longer enjoy the non-monetary rewards of the credit game and it would put in danger its past debts because the game could be over. If one banker does not cooperate, no one will do it[52].

The banker had a strong incentive to repeat the game and cooperate. The bankers knew that their cooperation was the best outcome whenever the king had enough money to pay. A new *asiento* was the best way to get their money back and cash their arrears[53]. In 1553-1554 many bankers agreed to lend new small amounts in order to save the large amount that the Crown was owing to them[54].

[51] Carande (1968), vol. 3, p. 187.
[52] It was not a contestable relationship. Entry or exit was difficult and the strategic behaviour was relevant. Firms were reluctant to enter an industry because it was very costly to exit. Baumol Panzar and Willing (1982).
[53] Carande (1968), vol. 3, p. 205. There are several examples for the Carlos I´s reign.
[54] Ibidem p. 449.

IV. Conclusions

This paper shows an explanation to illustrating how unorganized communities of lenders, without solving its coordination problems were able to lend money to the sovereign year after year. The case of the Spanish Monarchy during the sixteenth and seventeenth centuries provides a real case to prove the predictions of this model.

The paper explains how the Spanish Monarchy was able to borrow from many different bankers without being organized to punish the king in case of default. A game and shared beliefs gave up the Monarchy the opportunity to increase the lender's confidence and get the amount of credit needed. Historical evidence support the conclusions predicted by this model of game.

King and bankers played the game of credit because both knew that they would be worse off if they could not establish cooperation. Bankers were looking for silver, a rate of interest and different non-monetary compensation that they could only find in Castile, while the king needed financial services to pay the wars in Europe and only the bankers could provide them. Without cooperation, the king would not have credit to pay the army, and the bankers would not have access to the Spanish silver. They would lose their privileged position controlling of the financial markets in Europe.

However, one of the shared beliefs in this game was that the non-cooperation outcome affected their payoffs differently. Non-cooperation was an outcome that damaged the king more than it did the bankers. Actually, bankers had diverse ways to do business and lending to the Monarchy was not their only activity, indeed for many of them it was not even the most important. However, the king did not have better options for paying his armies in Europe safety and quickly. The king really needed to play this game every year. Accordingly, the king was very interested in taking care of his bankers in order to play many times with them. It was something well known by all lenders and an important shared belief of this game.

Some models of sovereign debt predict that if there is no penalty, one observes no lending[55]. This constraint is a problem when there are many lenders and property rights are not clearly enforced. The lenders have to be organized to punish the king before lending. However, the models of sovereign debt with penalty present a serious credit rationing issue. The credit that the sovereign may get with these models will always be small amounts because the lenders are very powerful, so they can raise the price, or they are very weak and afraid to risk large amounts of money.

The model presented in this paper does not weaken the "credit rationing" issue raised in the sovereign debt theory but changes the elements that establish the limit. The paper shows that the limit of credit that a sovereign can borrow does not have to depend necessarily on the banker's penalty. Constraints of this model are: (1) the revenues of the Monarchy available to honor the contracts, (2) whether or not the

[55] Eaton et al. 1986, p. 488.

amount of credit is enough to pay all of the king's expenses and (3) the importance that the banker has for the sovereign.

If the ceiling of credit would depend on the penalty, the sovereign would have to give up more power to its lender before increasing his credit. When the limit depends on elements linked to the sovereign, the king does not need to weaken his position in the game. It avoids the paradox that the sovereign has to submit or even foster the ability of the lender to impose a punishment on him. Giving power to the banker perhaps is the way to solve a problem but it will create a new one, because a compact group could produce collusion among lenders, reducing the amount of credit available or making it more expensive.

In order to get the whole amount of credit that the sovereign needs, he plays the game with different bankers at the same time. While in other models, the banker avoid lending when there is competition, this model shows that the presence of more bankers is not bad for the game whenever the king does not make a distinction among bankers. Treating each banker as he were the only one increased the confidence of each banker about the game because they knew that the marginal value that their loans had for the king was not negligible. Spreading this belief among lenders was good for the king because it could increase the confidence of each one about the game and when he played the game of credit with many different bankers at the same time, he was able to create "competition" among lenders to avoid any kind of market power of a possible strong cartel. This may permit the sovereign to increase the amount of credit that he can borrow and maintain its price low.

The banker knew that he was unable to punish the king but he could save this problem of uncertainty estimating the value that his cooperation had for the Monarchy. He looked at the way the king treated other bankers and the current revenues of the Crown, *r*. He could expect that while they had positive values, the king would cooperate. The king tried to maintain these positive beliefs among the bankers as much as possible.

The bankers knew that the game would not be profitable when the revenues of the king would not be enough to get the credit that he needed. Accumulated debt would gradually reduce the revenues available to bargain and repay new credits in next periods, but the bankers did not know exactly when the bankruptcy would be declared. They estimated the probability of that situation each time they played.

The Crown used the bankruptcies to break those moments when cooperation was impossible because the revenues were not enough to get the amount of credit needed, or the bankers did not have enough confidence about the king's ability to repay. The bankruptcy was the king's way to recover a good position in the negotiation, increasing the confidence of lenders after transforming the old short-term bills into long-term debt. Once the Crown had more funds to offer in the negotiation, bankers started again to cooperate. Each lender knew that the bankruptcy would improve the game doing it more safely because the value of this game continued to be very high for the king.

After 1650, changing conditions compromised the stability of this game. The Crown's silver resources and its political power in Europe went down. The bankers found other opportunities to earn money in business that was less risky. Madrid lost its preeminence in Europe as a political and economic center, reducing the attractiveness of the city´ social environment. American silver began to be controlled far away from the royal administration, and Seville and Spain were no longer the obligated port of silver treasures. The strong social and economic incentives both players had for cooperation disappeared in the second half of the seventeenth century. The game of credit was over.

V. References

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VI. Appendixes

Appendix I. Variables in the payoffs of the game

M	Total amount of credit needed by the king in the game
K	Portion of M borrowed to the banker
i	Interest of the loan
g1	Amount of payoff retained by the king at the end of the game
F	Financial services provided by the banker
r	Ability of the king to fulfill the contract. It is related to the revenues of the Monarchy available to play the game $r = 1$ the king will repay, $r = 0$ the king will not repay
V	Value that the cooperation with the banker has for the king
[p]	Probability that the king fulfill the contract [p] = 1 the king will repay [p] = 0 the king will not repay
T	Non-monetary rewards given for the king to the banker

Appendix II. King's revenues: the value of r

In order to know the value of *r*, the lender should have to know the amount of revenues available, *R*, that the king has that year. This variable will allow the king to get the credit necessary depending on the annual income of the Monarchy, *Y*, and the amount of debt accumulated by the sovereign, *D*.

$$R = Y - D \quad (1)$$

Part of the debt is generated by the own credit game and the rest is related to external factors, *d*.

$$D = g1 + d. \quad (2)$$

The total amount of credit that the sovereign will be able to borrow from his bankers is given by the following equation, where the rate of interest of the credit, *i*, is also very important:

$$M = (Y - d) / 1 + i \quad (3)$$

The value of *r* is directly proportional to the ability to bargain new credit using the funds *R* available in each game and the total amount of credit that the sovereign needs *M*[56].

$$r = 0 \text{ if } R - M (1 + i) < 0 \quad (4)$$

$$r = 1 \text{ if } R - M (1 + i) \quad 0$$

Appendix III. The condition of the banker to cooperate

The payoffs of the banker can be calculated taking in account the value of the different variables in the game. Given the banker's belief, the expected payoff from playing (NC) is:

$$- i - T \quad (1)$$

While the expected payoff from playing (C) is

$$[p] (K + i + T - g1) + [1 - p] (- K - i + T) = 2[p] K + 2 [p] i - [p] g1 + T - K - i \quad (2)$$

The banker will lend if and only if:

$$2[p] K + 2[p] i - [p] g1 + T - K - i > - i - T$$

Computing the equation we get:

$$T > (- 2[p] K - 2 [p] i + [p] g1 + K) / 2 \quad (3)$$

[56] For simplicity, this paper only considers the values of *r* to be either 0 or 1. This does not mean that *r* could not take any intermediate values.

Appendix IV. Values of T as percentage when the banker lends 1 and the interest is 8 percent, depending on the values of g1 and the probability that the king default

[P]	T for g1=0	T for g1=0.33	T for g1=0.5	T for g1=0.67	T for g1=1
0	0.50	0.50	0.50	0.50	0.50
0.15	0.34	0.36	0.38	0.39	0.41
0.25	0.23	0.27	0.29	0.31	0.36
0.35	0.12	0.18	0.21	0.24	0.30
0.45	0.01	0.09	0.13	0.16	0.24
0.5	-0.04	0.04	0.08	0.13	0.21
0.55	-0.09	0.00	0.04	0.09	0.18
0.65	-0.20	-0.09	-0.04	0.02	0.12
0.75	-0.31	-0.19	-0.12	-0.06	0.06
0.85	-0.42	-0.28	-0.21	-0.13	0.01
0.95	-0.53	-0.37	-0.29	-0.21	-0.05
1	-0.58	-0.42	-0.33	-0.25	-0.08

Apendix V. Value of "Asientos" lent by bankers to the Spanish Monarchy, 1600-1650.

Years	Ducats	Years	Ducats	Years	Ducats
1600	2.822.000	1617	5.496.830	1634	6.536.116
1601	2.341.932	1618	4.818.194	1635	8.925.000
1602	3.890.036	1619	8.621.099	1636	4.842.313
1603	5.197.943	1620	3.545.000	1637	7.314.000
1604	3.983.829	1621	7.735.615	1638	7.360.273
1605	7.233.816	1622	7.999.000	1639	8.358.100
1606	4.119.432	1623	12.442.764	1640	10.079.400
1607	2.515.361	1624	6.539.973	1641	8.472.141
1608	3.990.535	1625	8.646.000	1642	10.697.439
1609	4.174.692	1626	8.013.998	1643	5.973.393
1610	2.561.332	**1627**	5.823.999	1644	5.183.161
1611	3.078.147	1628	7.713.308	1645	5.969.984
1612	5.987.781	1629	5.946.460	1646	5.453.600
1613	1.505.000	1630	4.761.971	**1647**	3.168.706
1614	1.450.498	1631	5.787.500	1648	4.795.705
1615	no available	1632	4.371.182	1649	4.284.055
1616	4.404.170	1633	8.254.978	1650	3.219.768

Source: Gelabert, J.E. (1999), p. 231.