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**Bills of Exchange as Money: Sources of
Monetary Supply during the
Industrialization in Catalonia (1844-74)***

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Abstract

The objective of this paper is to report and analyze the circulation of bills of exchange and other documents as media of exchange in Catalonia during the period 1844-1874. We describe this phenomenon and the different sources of monetary supply for the Catalan economy. The apparent conclusion is that economic growth generated a permanent excess demand for money, which could not be satisfied by the existent amount of different legal currencies. New developments in monetary theory provide a novel microeconomic basis with which these facts can be better understood. In particular, search theoretical models of money can explain how market forces create their own mechanisms to facilitate exchange and coordinate economic agents to adopt conventions about the use of generally acceptable media of exchange which are not necessarily fiat monies as we know them in contemporary economies. We provide empirical evidence about the determinant factors which influence the acceptance of media of exchange other than legal currency and the types of documents used to complete transactions.

I

Introduction

The problem of the availability of means of payment has been one of the main focuses of interest for historians working in the field of the Industrialization.¹ T.S. ASHTON (1945) reports that bills of exchange worked as media of exchange among industrial firms in the Lancashire during the period 1790-1830.² A possible explanation of this fact is the need of large amounts of media of exchange due to exceptional economic growth. The demand for money due to the massive number of commercial transactions which took place in this period seems to exceed the available supply of currency. We report a similar phenomenon in Catalonia during the period 1844-1874. One can argue that these new media of exchange were necessary for the development of industrialization in these two areas.

New developments in monetary theory provide a novel microeconomic basis with which to understand these facts. In particular, we explain the mechanisms that make possible the emergence of different media of exchange during periods of currency shortage such as the one we analyze. Specifically, search theoretical models of money can explain how market forces create their own mechanisms to facilitate exchange and agents adopt conventions about the use of generally acceptable means of exchange. In these models agents, who are specialized in consumption and production, search in the market and use optimal trade strategies. In equilibrium, some goods may emerge as media of exchange accepted by all or some economic agents. Acceptability is the key feature of any commodity which is used as money. It is an equilibrium feature, partly independent of other intrinsic qualities of goods such as storability, perishability, or homogeneity. The main implication of this kind of models is that the basic characteristic of any good which is used as medium of exchange is that it is acceptable by the agents in the economy. Other characteristics of money (durability, homogeneity, etc.) might be desirable, but not necessary in order to play the role of medium of exchange.

The main objective of this paper is to study the determinant factors that made bills of

¹On monetary history see, for instance, Michael D. BORDO (1986).

² T.S. ASHTON (1945) states that "bills of exchange of small denomination were commonly used in the north of England, and especially in Lancashire, for purposes which, in other parts of the country, were served by coin or the notes of local banks (...). The bill had become something more than a security for payment. The drawer very often passed it on to meet obligations of his own, and those who received it, in their turn, did the same. The bill was now a substitute for money" (p. 25). S. NISHIMURA (1971) is an important investigation about the use of bills of exchange in Britain.

exchange acceptable as means of payment, in coexistence with other more "natural" media of exchange, namely legal currencies that were also used for this same function. The data we use come from three different textile firms. We have their entire accounts, reflecting all sales of those firms and the media of exchange used to pay for them for a period of two years (1859-60). These data come from direct sources from the firms and due to this reason can be considered of exceptional accuracy. Moreover, the three firms are very different. In particular, they belong to different industrial steps and have different locations, internal structures, and sizes. As it has been stated above, we are interested in analyzing the determinants of the acceptability of different types of bills as money, considering their different characteristics. In particular, we argue that the acceptability of a specific asset may depend on variables reflecting characteristics of the transaction in which the debt is originated and the commercial counterpart.

In short, our main premise is that bills of exchange work as money if agents want to accept them as such. The only requirement for an asset to be used as money would be its acceptability by the agents concurring in the market. Furthermore, it can be argued that monetary supply does not consist merely on legal status money. In this historical context, the actions of individual agents in the market determine the amount and type of money. For this reason, the role of the supply of legal money should be given less importance than it has been done in previous studies. For instance, in Catalonia during the period we study, while there was a great shortage of legal status currency, this was not a determinant obstacle for strong economic growth. This seems to be contradictory with traditional historical explanations of the relationship between monetary supply and economic growth. Our analysis provides a possible framework in which to explain the possibility of economic growth with restrictions in the amount of legal money.

The implications and possible extensions of the analysis are taken up briefly in the final section of the paper. Section II offers a brief intuitive description of theoretical arguments about the nature of money as medium of exchange, which are closely related with our investigation. In section III we analyze three different aspects: first, we describe the monetary and financial systems in Catalonia during this period; second, we explain the uses of bills of exchange and other documents; and third, we present a description of our database and provide an econometric test of our hypothesis.

II

A new theoretical approach to money

One of the recurrent questions in the economic literature about money is what circumstances determine which objects will come to be used as generally accepted media of exchange.³ Although this is an interesting issue from a pure theory point of view, it did not seem to have much interest for applied economists, since most contemporary monetary economies rely on the generalized use of fiat money issued with the legal backing of the political authorities of each country. However, this has not been always the case. As we shall see in detail below, economic historians report episodes in which different objects were used as media of exchange.⁴ Most of these episodes were a result of the unconcerted market behavior of many individual agents, that is, as another outcome of their commercial relationships. It seems interesting to ask what objects would come to be used as money, what determines this particular choice and what are the possible consequences of this at a more aggregated level (for instance, how this can affect the definition of money supply and its relationship with economic development).

No doubt the key determinant factor of the circulation of a medium of exchange is its *acceptability*. Undeniably, it seems that one is more likely to accept as money an object that is accepted by many other individuals in the economy. In this respect, one can say that this characteristic of acceptability has a self-reinforcing nature. That is, acceptability is not an intrinsic property of goods being used as medium of exchange, but rather a property of the social convention governing the particular patterns of exchange of economic agents. In more technical terms, the acceptability of a particular object used as money is a property of an equilibrium, that is, the outcome of the individual actions of many rational agents acting optimally and taking into account what the rest of individual actions are. This intuition is true for any object used as medium of exchange, either an

³A medium of exchange is an object that is accepted in exchange by some agent only to be exchanged later for another object. A medium of exchange has only exchange value, and neither consumption nor production value can be derived from it by the individual who accepts it. A means of payment "is an object used to pay for purchases and settle debts" (KIYOTAKI and WRIGHT (1992)). Although there could be some circumstances in which these two concepts do not coincide, for the purposes of this paper, we shall ignore this distinction and consider both terms as synonyms. Standard textbooks introduce the question of money giving a list of three functions to be performed by it: medium of exchange, store of value, and unit of account. Here we consider only the role of medium of exchange of money, following the convention that this is its more important role and that the others are merely derived from it.

⁴Most notably, we should refer the reader to the wide amount of literature about the free banking experience in a number of countries. See, in particular, L.H. WHITE (1984), K. DOWD (1992) and L.H. WHITE (ed.) (1993).

intrinsically worthless (not used for consumption or production) object, *fiat money*, or an object valued for consumption or production by some agents that, nevertheless, is accepted by some other agents only for its exchange value and to be traded for other goods, *commodity money*. These are not new notions in monetary theory, and they were established by some of the first economists who took up the question of money and its role in the economy. Thus, MENGER (1892) emphasizes the concept of *saleability* (which we will take as synonymous of related notions such as acceptability or marketability) of goods used as medium of exchange. A question arises: does this mean that any object could appear as money as long as there is some sort of social agreement about its acceptability as medium of exchange? The answer appears to be yes.

The previous discussion seems to overlook aspects of money that have also deserved considerable attention by eminent economists. In answering questions about the circumstances under which a particular object may have come to be used as medium of exchange, authors have stressed the important role of the intrinsic properties of different objects in order to assess the likelihood of these goods to appear as money. JEVONS (1875) gives a list of requirements that any object should have in order to be suitable to perform the function of medium of exchange. Among others, portability, homogeneity, divisibility, stability of value, cognizability, and indestructibility are regarded by him as necessary qualities of any commodity performing the function of money. This alternative explanation about the characteristics of money can be seen as, at least, partly contradictory with the above explanation stressing the conventional aspects of money that only highlights the acceptability aspect of media of exchange. The questions to be answered are the following: can any good appear as medium of exchange provided that there is an extended enough social agreement about its role?; or, on the contrary, do specific intrinsic properties of goods preclude them from appearing as a generally accepted media of exchange? Recent developments on the theory of money, using concepts from search theory and modern dynamic economic modelling, illustrate the trade off between endogenous acceptability and intrinsic properties and help us to provide satisfactory answers to such questions.

The fundamental interest of this section is to describe the main characteristics and highlight the principal conclusions of models of money that use ideas coming from search theory. While most models in monetary economics have focused on finding equilibria in which an object, previously and exogenously determined as money, has a positive price (that is, is considered valuable by individuals to perform the role of medium of exchange), search theoretical monetary models are, in many senses, models of currency choice, where the commodity used as money is determined as part of the

equilibrium of the model. Thus, the crucial feature of these models is that they provide a framework in which the determinants of the circulation of different objects as media of exchange are analyzed endogenously. In other words, the specific media of exchange used by the agents of the economies modelled in this literature are determined as a feature of the equilibria of the model. The objective here is to describe in some detail the main features of the general models and refer to their main conclusions about the emergence of different objects playing the role of media of exchange.⁵

Agents in this kind of models are specialists in production and consumption and derive utility from consumption and disutility from production. There are many (at least three) types of specialized individuals who are always holding some good in inventory. In general, there can be a variable number of agents of each type. Goods are not identical and, in fact, have different characteristics such as storability, perishability, homogeneity, etc. All goods are indivisible.⁶ The pattern of specialization is such that exchange will be a necessary condition for consumption to take place (nobody produces the good she consumes) and, moreover, there will never be double coincidence of wants of the goods produced by any two agents. This means that exchange cannot take a pure barter form and that, consequently, some sort of monetary exchange pattern must emerge if there is going to be exchange at all. In other words, existence of some good playing the role of money is a necessary condition for exchange and consumption. The structure of the economy is decentralized. No centralized market exists and agents only meet through a random matching process. Every period of time, agents meet in pairs and decide about whether to exchange the goods they hold in inventory or not. Whenever an agent gets the good she wants to consume, she will consume it and produce a new good that she will store until she exchanges it for another good after a trade meeting with another agent. In this particular setup, agents must adopt trade strategies in order to maximize their individual expected lifetime utility, which is basically a function of how much they consume. A trade strategy is a rule that specifies the actions to be taken by the agent in all possible situations. These possible situations of agents are characterized by two different elements: the good held in inventory by the agent herself and the good held by her trading partner in a particular meeting. The distribution of the goods held by the agents in this economy at any moment of time will be determined by an initial distribution and their trade strategies (which will be assumed not to vary over different periods of time). An

⁵ Basic references the interested reader should regard along the discussion are KIYOTAKI and WRIGHT (1989), WRIGHT (1993), and CUADRAS-MORATÓ (1994a, 1994b).

⁶Indivisibility of agents is a crucial simplifying assumption of the model. It means that when trade takes place, it will always be "quid pro quo", this is, agents will simply swap their inventories. The consequence of this will be that prices are left aside of this model or, better to say, prices of all goods are fixed and always equal to one in terms of any other good in the economy.

equilibrium of this model will be defined as a set of trade strategies for the different type of agents plus a distribution of inventories such that the following two conditions hold: a) given the strategies for the rest of agents and the distribution of inventories, the strategy adopted by each individual agent maximizes her expected lifetime utility (this is the standard condition for Nash equilibrium); and b) the equilibrium distribution of inventories is the resulting distribution from the interaction of the optimal trade strategies of agents in equilibrium (this is a consistency condition).

What is behind all this complicated theoretical terminology? It can be summarized in the following way. Whenever an agent must take a decision about exchanging a good she is currently holding for another good that is not her consumption good (that is, a good she is going to use as medium of exchange), she must evaluate two things: how marketable (saleable) this good is, something that is determined jointly by the strategies of all agents in the economy (obviously, trade strategies of agents are what make a particular good more or less acceptable from an individual agent point of view); and what are the particular intrinsic characteristics of this good that make it more or less costly to hold in inventory (goods can be more or less storable, they differ in their durability and one runs the risk that they may perish before one can get rid of them, they might be of heterogeneous quality, etc.). In other words, on the one hand a good might be very acceptable and, as a consequence, have a liquidity advantage, even if it is relatively costly to hold, while on the other hand goods with relatively low costs might be less acceptable in equilibrium because of the particular trade strategies of agents. The equilibria and its characteristics will precisely depend on the joint interaction of all these factors, but the different media of exchange used by the agents in this economy are precisely determined endogenously in equilibrium. One could say that this type of theoretical constructions constitute good devices to analyze the specific endogenous "choice" of media of exchange made by an economy. Although technically these models might seem complicated, the intuition behind them is not only simple, but was anticipated many years ago by some of the first economists who wrote on the subject of money.

What are the implications of these models for the specific problem we study in this paper? As it will be shown below, we are not examining neither commodity money nor fiat money, but rather some other objects (documents such as promissory notes and bills of exchange) that we argue circulated as media of exchange among firms in the period of industrialization in Catalonia. We are trying to understand what are the reasons that can give to individual entrepreneurs the incentives to accept some particular objects as media of exchange in our specific historical context. In order to do that, we can apply some of the conclusions derived by search theoretical models to the type of

situation encountered by an individual firm who must decide about whether accepting or not some privately issued document as medium of exchange. We argue that the nature of the transaction, the characteristics of the trading partner and the market in which both agents interact, and the particular features of the object used as money will determine the probability of acceptance of that document for a given individual firm.

A first determinant factor of the acceptance of documents other than money is the general context in which the entrepreneurs are inserted. Obviously, relative scarcity of fiat money will cause the progressive substitution of this kind of medium of exchange. Other objects will be used by agents to pay for their transactions, depending on their relative abundance and the willingness of agents to accept them. Consequently, we want to include some localization variable which may control for this effect in our empirical model. Secondly, we want to include variables that may indicate whether there is a long-term commercial relationship between a firm and a particular customer. This is because we believe that firms will take documents coming from different customers as different objects (commodities of heterogeneous quality). This is due to the fact that there is a reputation effect and long-term customers are likely to be "good quality" customers, which means that they are allowed to pay with privately issued documents such as bills of exchange or others. This is a variation respect to the theoretical models, in which interaction takes place among anonymous agents and reputation effects do not have any room. In a more realistic setup, however, firms clearly have different types of customers who can be perfectly identified and, as a consequence, we must take this variable into account. The way we think about this is making the hypothesis that different customers pay their debts with documents that are regarded by firms as being of different quality (this quality being related with different information and degrees of trust the firm has about its costumers and the related notion of reputation)⁷. Finally, we will also devote some space to study the choice of documents with different intrinsic qualities offered to firms. In particular, we will model the choice between documents to be paid before a given date and documents without this restriction in order to analyze the determinant factors of this election.

⁷Ideally, one would like to have an explicit model with nonanonymous agents in which reputation effects could be derived. For a first model following this spirit, although tackling different issues, the reader can see SIANDRA (1994).

Bills of Exchange as Money

III.1. Monetary Supply in Catalonia (1844-1874)

The Catalan economy grew very rapidly during the period 1844-1874 (see Table 1). In fact, Catalonia became the first industrial region in Spain and one of the most important in the Continent. The main industry was, by large, the cotton. This sector completed its mechanization during this period and achieved important improvements of productivity. At the same time, modern transportation networks were built (most notably, railways) and towns were enlarged. These transformations, which happened in a relatively short period of time, took place relying almost exclusively on domestic capital. Moreover, Catalonia had during this period an important commercial deficit with the rest of the world, due to its massive imports of technology and raw materials, mainly coke and cotton.⁸

Table. 1 *Indicators of Catalan economic growth (1835-1861)*

Year	COTTON	MESP	CODE	HPI	I IO
1835	2,9			115	100,0
1841	8,4	347	12	476	120,4
1850	15,3	623	66		185,9
1861	20,1	896	131	9960	332,9

COTTON: Raw cotton imported (thousands of Metric Tons).
MESP: Thousands of mechanical cotton spindles.
CODE: Coke consumed by industry (thousands of Metric Tons).
HPI: Horsepower installed into industry.
IIO: Index of Industrial Output (1835 = 100).

Data source: Albert CARRERAS (1990) and Jordi MALUQUER (1994).

The financial system also suffered important transformations. During the XVIII and first third of the XIX century there was only a small number of private bankers. In 1842, a legislative reform allowed for the first time the establishment of private banks organized as limited liability corporations.⁹ They were granted the legal monopoly of issuing notes which were legally only valid in the same town where they had been issued. Consequently, notes were not exchanged across different towns. Due to this, the Spanish experience is not directly comparable to other contemporary experiences, namely the "free banking" regimes that existed in other countries. One of these banks

⁸ Classical essays on the Catalan Industrialization are NADAL (1974) and Jordi MALUQUER (1985).

⁹Gabriel TORTELLA (1973).

was established in Barcelona in 1844.¹⁰ Two other banks, much less important than this one, were established in the Catalan towns of Reus (1862) and Tarragona (1864). In 1855, several different new banking corporations were also established in Barcelona. Some of them were similar to the *Societés de Cr dit* (industrial banks) and others to the *Commercial Banks*. The main problem for these banks was to attract new savings, since they were not granted the privilege of issuing legal money, which remained a monopoly of the *Banc de Barcelona*.

This formal financial system was subject to great instability during its short period of existence. There were three reasons for this. First, the difficulties found by the banks to attract new savings. Second, the lack of experience of the directors of the institutions, which caused mistakes in their portfolio management. Third, the advantageous position of the *Banc de Barcelona* which was the only one that could issue legal notes. For this reason, in the years of crisis, the public showed their preference for safer media of exchange such as coins or notes of the *Banc of Barcelona* rather than other documents issued by the rest of the banks. Several financial crisis can be reported, the most important of which were in 1848, 1857, 1863, and 1866. At the end, this last crash eliminated the competitors of the *Banc de Barcelona*, which increased its market share. However, the *Banc de Barcelona* could not keep its monopoly of creation of money much longer, because in 1874 this right was granted in exclusive for the whole territory of Spain to the *Banco de Espa a*.

The monetary system in Spain during this period was very complex and the result of successive reforms.¹¹ The traditional main source of Spanish currency was the commercial surplus with the Spanish American colonies and the direct transfer of taxes from the colonies as well. At the same time, Spain had a very large commercial deficit with the rest of the world, which meant that a great deal of the currency coming from America had to be exported to offset the balance of payments. First, the Convention and Napoleonic Wars and afterwards, the loss of the colonies in America limited seriously the chances of getting new metals to offset the already chronic Spanish commercial deficit. The main consequence of this deficit was the progressive loss of gold and silver and the drastic reduction of the domestic money supply. This reduction led to a deep deflationary crisis in the whole economy in the first third of the XIX century (see Figure 1).¹²

¹⁰ On the history of this bank see Francesc CABANA (1978).

¹¹ On the evolution of the Spanish Monetary system see: Joan SARDÀ (1948) and Gabriel TORTELLA (1981, 1994).

¹² Pere PASCUAL and Carles SUDRIÀ (1992) is a recent review of this point of view; a critical view about this in Leandro PRADOS (1982, 1988).

From 1830 to 1874, different governments implemented several reforms in order to solve this problem.¹³ The most important legal reforms took place in 1842, 1848 and 1864. In spite of them, these measures did not seem to succeed and were not sufficient to create sources of stable monetary supply. Firstly, there were several frustrated attempts of establishing new and definitive monetary units (*rals de billó*, *escuts* and *duros*). All these attempts failed because the government never gathered enough amount of gold and silver to mint sufficient coins. The final outcome of the process was a complicated and confusing monetary system, with multiple co-existing units. Secondly, the creation of different issuing banks was not very successful either. In the Catalan case, for instance, although it could seem that the presence of the *Banc de Barcelona* in the money market would solve, at least partly, some of the problems of the Catalan economy, at the end of the day the outcome was totally different. The management of the bank adopted very conservative policies and maintained big amounts of capital in reserve, in search of greater stability. The behavior of the bank was such that in the worst moments of the economic cycle the bank maintained so big amounts of reserves that its net contribution to the creation of monetary supply was negative. These policies can be explained by two reasons: the absence of competitors and the inexperience of the board of directors of the bank.¹⁴ Moreover, the denomination of the notes of the bank was too high and this was an inconvenient for their general daily use.

Table. 2 *Fiat money issued in Catalonia until the end of 1858*

Issued by	Type	duros	%
Banc de Barcelona	Bank-notes	2.124.275	32.56
Diputació de Barcelona	Bitllets-Calderilla	1.739.123	26.65
Credit & commercial banks	Talons registrats	636.381	9.76
	Obligacions	2.024.250	31.03
Total		6.524.029	100.00

Source: Pere PASCUAL and Carles SUDRIÀ (1992)

During 1852 new fiat money was added to the supply of the *Banc de Barcelona*. The government decided to substitute the old copper coins minted in Barcelona with new coins (*calderilla castellana*).¹⁵ However, the government did not have enough of these coins to substitute for all the

¹³On Spanish monetary policy see Joan SARDÀ (1948) and Gabriel TORTELLA (1981).

¹⁴Joan R. ROSÉS (1993).

¹⁵These were the same copper coins traditionally used in the rest of Spain, which had different weight and value.

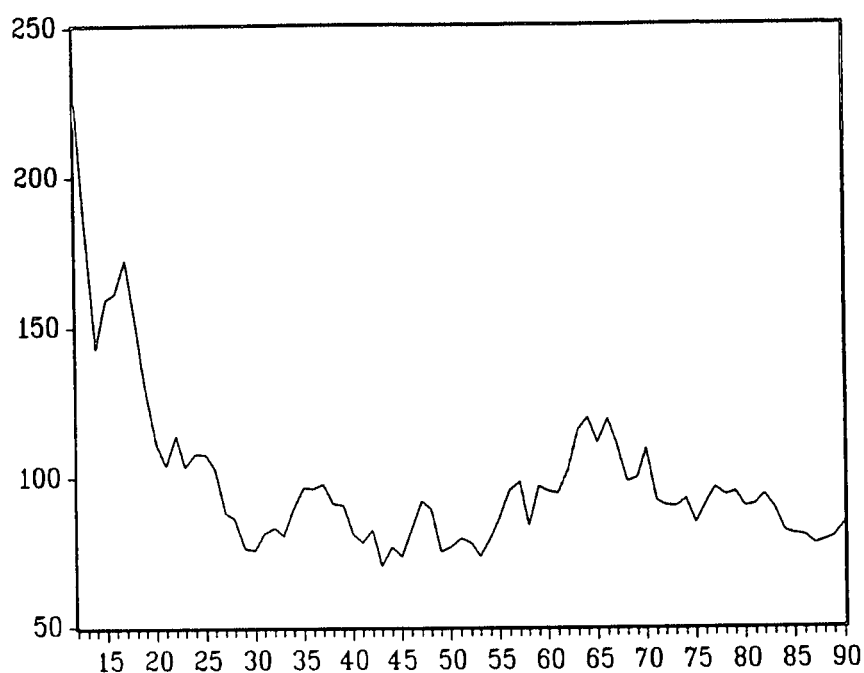
copper coins minted in Catalonia and, as a consequence, had to issue notes to make for the difference. These notes had a redemption date because they had to be progressively substituted by coins. They were of compulsory acceptance in transactions with the government and, partly, in transactions with private agents (legal regulations guaranteed that a fixed percentage of any debt could be paid using these notes). These notes were less valued by the public than the notes issued by the *Banc de Barcelona* and the metallic currency. Consequently, their price was below their nominal value. Apart from this, from 1855, the new banking corporations (mentioned above) issued other financial instruments in order to attract new capital and overcome the monopoly of issuing notes in the hands of the *Banc of Barcelona*. Thus, they started issuing bonds and checks (*obligacions al portador* and *talons registrats*)¹⁶ which were used by the public as means of payment (see Table 2). Although these documents were sometimes called "bitllets" (notes), this type of money had no legal consideration. In fact, some economic agents accepted those instruments as payment for relatively important transactions (i.e. in the stock market), although their use for daily commercial operations was very exceptional.¹⁷

As Figure 1 indicates, the evolution of prices in Catalonia from 1844 to 1874 is characterized by a slight growth of the price level (0.64% cumulative per annum). Analyzing different subperiods seems to indicate that there is some correlation between changes in the financial system and the movements of prices. From 1844 to 1855 the absolute monopoly of the *Banc de Barcelona* results in a low inflation rate (1.07%). The following period, 1855-1866, when more corporate banks are acting in the market, is characterized by a much higher inflation rate (3.04%). The period which follows the crisis of 1866 (1866-1874) is distinguished by a relative important deflation rate (-3.14%).

¹⁶*Obligacions al portador* were bonds issued by the banks, which had to be paid to the bearer in the office of the issuing bank with metallic currencies. *Talons registrats* were private notes created by the board of directors of the bank, and backed by the same bank, which had to be paid to the bearer under the same circumstances.

¹⁷As a matter of fact, we have only found a case (out of 2056 transactions we have analyzed) in which payment takes place with one of those documents. This case corresponds to a relatively big transaction.

Figure. 1 *Barcelona Wholesale Price Index, 1913=100*



Following the arguments by Milton Friedman (1990) on bimetallism, one could think that this general price stability was mainly caused by this particular monetary regime. Nevertheless, we argue that this was not necessarily so in the Spanish case because the volume of gold and silver in circulation has been found to be very small (Tortella (1994)). Contemporary economic press gave references on the importance of currency shortage for the financial crisis in Barcelona. Thus, Joan Sala, financial markets analyst of the *Diario de Barcelona* said in 1860:

"The shares are cheap because money is expensive; the shares are rejected because the price of money is high; the money is worth much because is scarce. We have, then, that the origin of our wrong is currency shortage, and that the secret of our remedy is bringing money.

How will this money import be accomplished? Getting it from abroad or from the Spanish government, because one cannot appeal to the rest of the provinces of Spain because they have needed for their railways the aid of the foreign and Catalan capitals."¹⁸

¹⁸ *Almanaque del Diario de Barcelona para 1860*, p. 109 (Spanish in the original).

Summing up, we have the following elements: rapid economic growth in a very short period of time, an important commercial deficit which was offset with exports of metals, price stability, and, finally, an apparent shortage of currency. These facts seem to be contradictory with standard macroeconomic theory. We argue that a possible explanation to this puzzle lies on the use of bills of exchange and other privately issued documents as means of payment, probably due to this shortage of other alternative media of exchange.

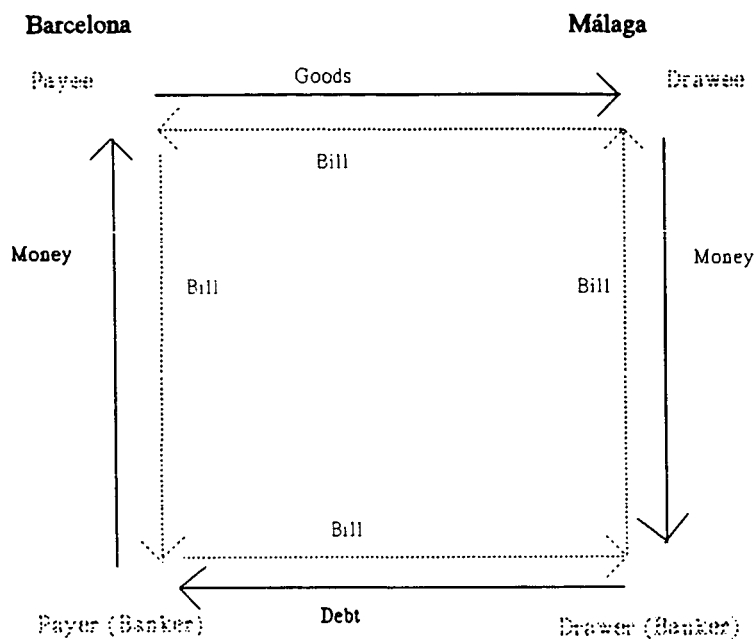
III.2. *The uses of bills of exchange*

The "Financial Revolution" took place in England during the XVIIIth century. This revolution did not consist merely in a reform of government finance; it also included a new regulation of financial documents such as, among others, inland bills, promissory notes, and bills of exchange. Recent interpretations of these phenomena have emphasized that this was a necessary, although not sufficient, condition for the success of the Industrial Revolution.¹⁹ These instruments, however, had been used in international transactions in the Continent at least since the XIIIth century, and Catalonia was not an exception. For a long time the use of these instruments was regulated by consuetudinary rules. During the XVIIIth century, as in England, the *Consulats de Comerç* (local associations of merchants that were created under royal patronizing) of several towns had established various rulings governing the creation and use of bills of exchange and similar instruments. Nevertheless, it was not until the promulgation of the first Code of Commercial Law in Spain (1821) that the definitive bases for the regulation of this type of financial instrument were established. In fact, this new legal ordering allowed the generalization of their use in trade relations.

The Spanish Code was basically an adaptation of most of the French Code. This means that it was very detailed, as it was in most of Europe. Bills of exchange were defined in the Code as a contract involving a private promise of payment. Generically, it established two basic types of bills: those that had to be paid after some days after its presentation (i.e. eight days), although the Code limited their legal enforcement during forty days; and those that had to be paid in a particular date (i.e. the 24th of February of 1834). Moreover, the bill could or could not be signed by the drawee. Consequently, many of these bills were incomplete contracts. In these cases, the drawee had the legal responsibility for the payment of the bill. Moreover, the legal framework established other different type of documents as well: promissory notes (*pagarés*), which were bills signed by the debtor and legally enforceable only in the town where they had been issued. These instruments were much safer from a legal point of view because their enforcement could generate the seizure of properties. Also there existed *cartes-ordre*, which were similar to the bills of exchange but legally valid only in the town where they had been issued.

¹⁹ Larry NEAL (1994).

Figure. 2 *The use of bill of exchange as a medium of transfer money*



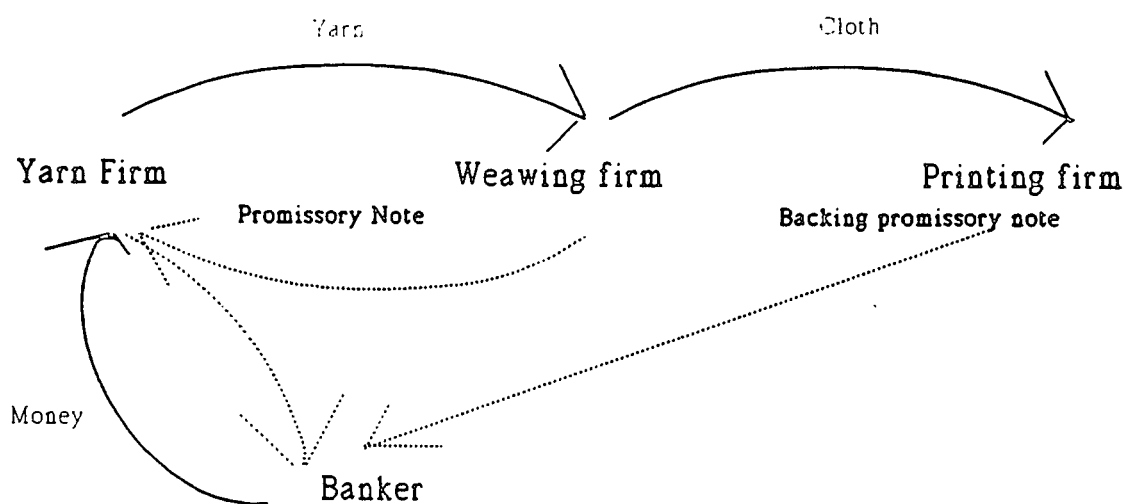
Initially, bills of exchange were created as instruments to transfer capitals between merchants from one place to another. In particular, when a customer from outside Catalonia wanted to cancel a debt, he would buy a bill against some firm located in an important financial place in Spain or Catalonia and sent it to his Catalan creditor. Bills of exchange had differential demand depending on their origin and during this period and the Spanish financial market remained not integrated. For these two reasons, the prices at which they were negotiated were also different.³⁰ An example of the use of the bill of exchange to transfer capitals is illustrated in Figure 2. This example begins when a Catalan entrepreneur sends cotton textiles to another tradesman in Malaga. In order to cancel this debt, the Malaga merchant needs currency valid in Barcelona. He gets a bill of exchange against this town from his banker. In the next stage, he dispatches this bill to his supplier in Barcelona. In the final stage, the bill is 'extinguished' by the signature of the final holder of the bill and is sent back to the original drawer.

The evolution of the use of bills of exchange was such that, at some moment of time, they became an instrument of credit and a medium of exchange. In Spain, both bills of exchange and promissory notes could be used as instruments of credit. The bill of exchange was an incomplete contract, because it was seldom signed by the debtor, and the promissory note was a complete contract because always had to be signed by the borrower. The merchant banker bought a bill from

³⁰Lluís CASTAÑEDA and Xavier TAFUNELL (1993) and Lluís CASTAÑEDA (1993).

the local trader as the basis for lending him money. Afterwards, this bill was negotiated and flowed from one town to another being used as medium to transfer money. Finally, it was cashed in on its expiration date by the last holder and the borrower paid its value. The use of promissory note was more clear in the sense that the borrower was always liable for the debt. Figure 3 illustrates the use of promissory notes as instruments of credit. For instance, an industrial sold cotton yarn to a cotton weaving firm. This firm made fabrics to be sold to another firm who printed them. The whole productive process of weaving was financed by the yarn firm through open credit. After ninety days of open credit, the weaving firm signed a promissory note which was backed by the printing firm. The promissory note was kept until the day it had to be paid-off or was discounted in a bank or, finally, could be used as medium of exchange. Summing up, the promissory note was part of a general contract of sale and credit.

Figure. 3 *The use of promissory note as an instrument of credit*



However, the main use of the bill of exchange in Catalonia during this period was medium of exchange. A representative case can be seen examining the relationship between *Pere Turull*²¹ and one of his best customers *Antoni Galí i Cia*. Both families were in the wool trade and had known each other for more than a half of a century. *Antoni Galí* had become the most important wool industrialist

²¹Details of the commercial activities of this merchant are given below when we describe our database.

in Spain and bought a great deal of the raw wool sold by *Pere Turull*. *Antoni Galt* was given credit for more than one year in his purchases of wool to *Pere Turull*. He paid when it was more convenient for him and *Pere Turull* accepted that almost all payments took place with the transfer of bills of exchange issued by third parties (these bills were obtained by *Antoni Galt* as a payment for his own commercial operations). *Pere Turull* was aware that part of those bills of exchange would be unpaid, but he trusted that *Antoni Galt* would take charge of those. *Pere Turull* could do three different things with the bills he got from his customers: first, he could pass them to another firm to cancel some debt; second, he could sell them to his banker from Barcelona; and third, he could try to get paid directly by the final debtor of the bill (although this only did very exceptionally). As a conclusion, it was far more important the reputation of the customer (who passed the bill to the firm) than the quality of the final debtor (who was finally responsible for the debt).

We argue that the use of bills of exchange was mainly medium of exchange. We can justify this statement by looking at the accounts of the firms we are studying during this period. The vast majority of bills and other documents accepted by one firm was passed on to meet obligations of his own (that is, to be used as means of payment). Thus, the accounts of one of the firms we examine, *Miquel Puig*, reflect that, in 1860, only two bills of exchange were discounted at the bank, while the other 147 were passed on to different firms to pay for commercial debts. The same thing happens with another firm we study, *Pere Turull*, for whom the volume of trade that take place via circulation of bills of exchange is much greater. In this case, also the vast majority of bills accepted as payment of his sales would be used to pay for his own obligations (he used means of payment other than documents only in 17, out of 696, operations of payment of purchases)²².

The economic growth due to the industrialization process provoked an increase of the number of commercial transactions and agents in the markets. Consequently, the number of bills in the market and their use grew at a high rate. For this reason, the bill of exchange became less safe as payment, but at the same time more acceptable, because of its generalized circulation. Anyway, its nonpayment and negotiation remained costly. This was due to the fact that, to claim legally for the payment of a bill, there were some formal requirements which were expensive and took long time. A typical bill of exchange was created when a commercial transaction originated a debt between two firms. The seller drew the document against the buyer and kept the final legal responsibility in the case the final debtor did not accept the bill. Usually, the seller would pass the document to another firm to cancel

²²A detailed description of our database can be found later in the text.

a debt which normally did not have anything to do with the original transaction. This third firm could also pass the bill to a fourth firm and, eventually, the bill would be paid by the final debtor against whom it was issued. If the final debtor did not accept the bill, each one of the agents who had accepted it could claim for the payment to the firm who had passed it to them. Obviously, the last responsible for the payment of the debt was the firm who drew the bill of exchange. Consequently, only reputation, confidence and continuity of exchanges made the use of bills of exchange an efficient means of payment.

Summing up, although the intrinsic qualities of the bills could be a serious disadvantage in order to use them as efficient medium of exchange, the existence of commercial informal networks made this possible and economically advantageous. Bills of exchange were an instrument of payment for the agents inside those networks. The only requirement to accept a bill of exchange as money was to know and trust the agent who gave it to you. This made it acceptable enough as means of payment. Hence, it was not necessary to know the person who had to pay the bill in the last instance. As it is obvious, agents in these networks were very interested in keeping long term commercial relationships and, consequently, had to look after their reputation by honoring their obligations. Moreover, it was not easy to enter into those networks. In fact, an unknown entrepreneur was asked for a good reference or even an endorsement before being accepted as regular customer.

III.3 Empirical evidence

The objective of this section is to provide some empirical evidence on individual decision-making about the choice of media of exchange. Aggregate data does not provide much information on which this kind of analysis can be based. However, the availability of new microhistorical data will allow us to analyze this phenomenon with a entirely new perspective. Based on information gathered from the accounts of several Catalan textile firms for the period 1859-60, we propose an econometric relationship based on the kind of theoretical intuitions described in the models explained in the previous section. In particular, we want to present two different models trying to explain which are the most relevant variables that may explain the type of medium of exchange to be used in the different commercial transactions of the firms analyzed.

The entire database has been built by looking directly at the accounts of three different firms. Each observation corresponds to an operation of payment of a previous sale made by the firm. In other words, each datapoint describes several characteristics of these transactions and the media of exchange that were used to complete them. Moreover, we consider specific characteristics of the customers involved in each of the operations.

The three firms belong to the textile sector, which was the predominant in Catalonia during this period. The first firm, *Pere Turull*, was specialized in the trade of raw wool. It was located in Sabadell (approximately 30 km. away from Barcelona). Sabadell was the main center of production of wool textiles in Spain. This firm was very important and had under its control more than 40% of the trade in the sector in Sabadell. Most of its customers were from Sabadell itself and its surroundings. The circulation of legal currency in Sabadell was very scarce in relationship with the requirements of a growing economy. This was due to the absence of commercial banking institutions in town and also to the fact that the institutions located in Barcelona did not have direct links with it. The situation was such that employers used to pay their employees with privately issued notes which did not have any legal backing, but were accepted by the shopkeepers in town. *Pere Turull* used to sell its commodities giving open credit to its customers and without any supporting document. Thus, when debts were canceled *Pere Turull* would receive as payment either legal currency or some other documents (such as bills of exchange drawn by a third party). Obviously, bills of exchange were not used here as instruments of credit or transfer of money but as means of payment.²³

²³Source: Arxiu Històric de Sabadell, Fons Pere Turull, *account and letter books*, 1859-60 (complete database is available from the authors).

The second firm, *Miquel Puig i Cia*, was the sixth industrial firm in the Catalan cotton sector. It produced yarn and coarse and sold them to other Catalan industries. The factory was located close to the banks of the river Llobregat (Esparreguera), but all its operations were channeled through its main office in Barcelona.²⁴ The third firm, *Societat Puig*, stamped cotton goods in Sants (Barcelona) and sold finished clothes.²⁵ The relationship of these two firms with their respective customers was similar to *Pere Turull's*. These three firms can be considered representative of three different very common markets in the Catalan industrial sector: respectively, raw materials, intermediate products and final products.

Table. 3 Transactions in the sample classified by means of payment

Type	Operations	%	PTA.	%	
Currency	858	41.73	1.622.852	39.91	
Documents	1.198	58.27	2.443.571	60.09	
Total	2.056	100.00	4.066.423	100.00	
	Bills of E.	1.106	92.32	1.803.178	73.79
	Others	92	7.68	640.393	26.21
	Total	1.198	100.00	2.443.571	100.00
	Signed	193	16.11	866.173	35.45
	Unsigned	1.005	83.89	1.577.398	64.55
	Total	1.198	100.00	2.443.571	100.00

Source: See text.

Table 3 describes the means of payment received by firms in order to cancel debts. Notice that the use of documents as means of payment is more important than legal currency. Moreover, bills of exchange are the most common documents and unsigned documents are used more habitually than signed documents.

The methodology used in the analysis is the logit analysis. This procedure allows to estimate the probability of an event occurring given a sample of different explanatory variables. Specifically, given that the dependent variable is dichotomic (in the case of our first model, it indicates whether a transaction is completed with legal currency or some other document), the logit estimates a

²⁴Arxiu Nacional de Catalunya (Barcelona), Fons Sedó - Empresa Miquel Puig i Cía., *Account books*, 1859-60.

²⁵A.N.C., Fons Sedó - Societat Puig (Teixits), *Account books*, 1859-60.

nonlinear equation that indicates which are the determinant factors of a dichotomic event.²⁶

In the first of our models, we assume that the decision of paying for transactions with legal currency or some other document is depending on several factors. As we have seen, there was not enough currency circulating in the market to satisfy the needs of agents to complete their transactions. This situation was especially important in the case of firms located out of Barcelona, where there was a complete absence of formal banking institutions. This means that firms located away from Barcelona did have a more difficult access to legal currency and had to use alternative means of exchange for payment. At the same time, we need to control for the intrinsic characteristics of the transactions that may influence in the choice of means of payment.

The dependent variable is a dichotomic variable that takes value 0 when the debt originated by the transaction is canceled with legal currencies such as gold and silver coins, notes issued by the *Banc de Barcelona*, and "bitllets de calderilla catalana", and value 1 when the debt is canceled with some other documents: financial bills, bills of exchange, promissory notes, bonds and similar instruments. Our main hypothesis can be expressed by the following model:

$$\text{Prob}(\text{DOCUMENT}=1) = f(\alpha + \beta \text{BCN} + \gamma \text{ESP} + \delta \text{CAT} + \epsilon \text{NUM} + \zeta \text{PUR} + \mu). \quad (1)$$

This model tells that the probability that payment was made without legal currencies is a nonlinear function of the following variables: BCN is a dichotomic variable that takes value 1 if the firm to which the payment is made is located in Barcelona (*Societat Miquel Puig*) and value 0 otherwise; ESP is also a dichotomic variable which takes value 1 when the firm to which the payment is made is located in Esparreguera (*Miquel Puig & Co*) and 0 otherwise; CAT is a dichotomic variable that takes value 1 when the customer who pays for a transaction is located in Catalonia, and 0 otherwise; NUM is a variable which measures the number of transactions that took place during the years 1859-60 between the customer and the firm who are the subjects of each transaction; and PUR is a variable which measures the total value of the purchases (measured in pesetas) that took place during the years 1859-60 between the customer and the firm subject of each transaction.

The expected outcome of our analysis is that the probability that payment takes place without legal currency is a positive function of the variables NUM and PUR and a negative function of the

²⁶A model Logit was preferred to the alternative specification Probit given the particular characteristics of the sample. See GREENE (1993) for a discussion of this point.

variables BCN, ESP and CAT. We expect NUM to be positively related with the dependent variable because a major number of transactions between two agents indicates a closer long term commercial relationship between them and, consequently, a higher level of confidence. This reputation effect would explain the fact that bill of exchange (or other documents) were more easily accepted instead of universally acceptable legal currencies. Likewise, PUR is also expected to be positively correlated with the dependent variable. This is because a larger value of this variable can be considered to signal a better "quality" of the customer involved in the transaction. Obviously, good quality customers can get documents other than legal money more easily accepted than other customers. In a sense, we have two different variables which may be indicative of a reputation effect. First, the number of transactions between firm and customer, which shows the existence of an ongoing relationship with frequent commercial agreements. Second, the total value of the transactions between customers and firms is symptomatic of the fact that the relative importance of the customer influences the possibility he has to pay with instruments other than legal money.

The estimates of the coefficients of the three dichotomic variable are expected to be negative.²⁷ Variables ESP and BCN are expected to be negatively correlated with the dependent variable, because the supply of legal money in Sabadell was comparatively smaller than in the other two markets and, consequently, transactions involving a firm located there imply payment with document other than fiat money with higher probability. Likewise, variable CAT is expected to have a negative estimated coefficient. This is basically because firms situated outside Catalonia had more problems in order to find legal currency to pay with, because the formal financial system was even less developed than in Catalonia. Also, bills of exchange were more easily transported than coins in a period when bank notes did not circulate outside the place where they had been issued and promissory notes could be legally enforced only inside the same town where they had been signed. All this made more likely for firms located outside Catalonia to get accepted documents other than legal currency as payment for their debts.

²⁷One should be careful when interpreting the meaning of the coefficients of the categorical (dichotomic) variables. In our case, the categorical variables are indicative of two circumstances: first, whether the firm is located in Sabadell, Esparreguera or Barcelona; and second, whether the customer is resident in Catalonia and outside the firm's town. For the first of these features, we need to create only two categorical variables (ESP and BCN) as we have described above. In the second case, CAT reflects all the information we want to introduce. With categorical variables, the only statements you can make about the effect of a particular category is in comparison with some other category. This means that the coefficients of these variables represent the effect of each category compared to a reference category. For instance, the coefficient of the variable BCN indicates the change in the probability of the event we are modelling in comparison with a reference category that in our case is the fact that the firm is located in Sabadell. A negative coefficient means that a firm located in Barcelona has a lower probability of accepting a document as means of payment than a firm located in Sabadell.

Table. 4 Determinants of the choice of media of exchange

Logit	Dependent Variables Document					
	Param.	St. Error	Wald	Signif.	R	Exp (B)
CONSTANT	1.9904	.1768	126.7312	.0000		
PUR	2.4E-07	1.06E-07	5.4119	.0200	.0349	1.0000
NUM	.0192	.0044	19.3292	.0000	.0788	1.0194
CAT	-.4375	.1936	5.1070	.0238	-.0333	.6456
ESP	-4.0298	.2131	357.5769	.0000	-.3568	.0178
BCN	-3.1701	.1741	331.4963	.0000	-.3434	.0420
N 2056						
		Chi-square	d.f.	Signif.		
-2 Log Likelihood		1447.054	2050	1.0000		
Model Chi-square		1346.682	5	.0000		
Goodness of Fit		2183.374	2050	.0000		
Classification Table						
Predicted		.00	1.00	% correct		
Observed	.00	744	114	86.71		
Observed	1.00	137	1061	88.56		
Overall				87.79		

The results of the estimation of the first model are summarized in Table 4.²⁸ All the estimated coefficients of the variables have the expected signs and are significantly different from zero (as shown in column Signif.). Looking at the R column, one can observe that variables ESP and BCN have a similar partial explanatory contribution to the model and are the most relevant variables. This would be clearly indicative that restrictions on the monetary market are relatively important in the choice of media of exchange by firms. Notice that the other variables are significant, but their partial

²⁸In logistic regression you directly estimate the probability of an event occurring. The parameters of the model are estimated using maximum-likelihood method. The regression coefficients tell you the amount of change in the dependent variable for one-unit change in the independent variable. The Wald statistic is just the square of the ratio of the coefficient to its standard errors. Moreover, R statistic is used to look at partial correlation between dependent variable and each of independent variables. R can range in value from -1 to +1, and a positive value indicates that as the variable increases in value, so does the likelihood of the event occurring. Negative values for R indicate that opposite is true. Small values for R shows small partial contribution of the variable to the model. The factor Exp (B) shows increasing of odds when a factor change. For this, Exp (B) allows to calculate the probability of an event for a concrete case. There are different ways to asses whether or not the model fits the data. First, we look at the likelihood, which is the probability of the observed results given the parameter estimates. To test the null hypothesis that the observed likelihood does not differ from one (the value of the likelihood for a model that fits perfectly), we used the value of -2 Log Likelihood. This is a measure of how well the estimated model fits the data. Second, we used model Chi-square that is comparable to F test for linear regression. The model chi-square tests the null hypothesis that the coefficients for all of the terms in the current model, except the constant, are zero. Third, we present the goodness-of-fit statistic of the model, which compares the observed probabilities to those predicted by the model. Finally, we also show the classification table, which compares our predictions to the observed outcomes.

contribution to the model is less relevant. Finally, observe that the different measures of the goodness of fit of the whole model are satisfactory with the hypothesis that this model fits well the available data.

All document which were used as substitutes of money can be classified into two different categories. First, documents which had to be paid after some days after its presentation to the person who issued it in the first place (unsigned documents). And second, those which had to be paid in a particular date (documents signed by the debtor). In general terms, the first type of documents were far easier to transfer than the second, because they did not have a deadline after what the legal enforcement of the payment was much weaker. The second type of documents had stronger legal protection to be paid before the deadline date, because they were signed by the debtor himself. As a consequence, one could say that while the first type of documents clearly had a liquidity advantage (easy transfer), the second were safer from a legal protection point of view.

The second of our models analyses how the choice of media of exchange can be related to these intrinsic characteristics of the objects to be used as money. We take a subsample of our database consisting on all operations in which agents used documents other than currency to cancel debts (1198 observations). Our dependent variable will be a dichotomic variable indicating whether transactions take place with unsigned documents or signed documents. Specifically, the variables takes value 1 if the document was signed by the debtor and 0 otherwise. The model is as follows:

$$\text{Prob}(\text{SIGNED}=1) = f(\alpha + \beta \text{PTA} + \gamma \text{DAY} + \delta \text{ESP} + \mu). \quad (2)$$

This model tells that the probability that cancellation of debt was made with a signed document, that is, a document which had to be paid before a particular date specified in it, is a function of the following variables: PTA is a variable that measures the value of the debt generated in each of the operations; DAY is a variable that measures the number of days passing between the day in which the document is received by the firm and the first day in which the firm gets paid; ESP is a variable described above.

The expected outcome of the estimation of the model is that the probability that payment takes place with a signed document is a positive function of the variables PTA, DAY, and ESP. We expect PTA to be positively related with the dependent variable because the larger the amount of the debt, it becomes more important to get a safe payment rather than a easily transferable asset. Likewise,

DAY is also expected to be positively correlated with the dependent variable because firms will only be willing to accept signed documents in cases when the date of payment (after which the document loses great part of its legal enforcement) is late enough. In fact, it could be said that signed documents are mostly instruments of credit rather than strict means of payment. The coefficient of the variable ESP is also expected to be positive, but this is due to the fact that the particular firm we study located in Esparreguera had contracts with some of its customers and signed documents were part of these contracts. In fact, we did not have any general reason to expect any difference among the different firms that form our sample, apart from this particular aspect of this firm.

Table. 5 *Determinants of the choice of signed documents*

Logit	Dependent Variables Signed					
	Param.	St. Error	Wald	Signif.	R	Exp (B)
CONSTANT	-8.7631	.5747	232.5091	.0000		
PTA	.0002	7.29E-06	7.2143	.0072	.0702	1.0002
DAY	.6056	.0519	136.2952	.0000	.3563	1.8323
ESP	2.5156	.3963	40.3010	.0000	.1903	12.3741
N 1198						
		Chi-square	d.f.	Signif.		
-2 Log Likelihood		320.942	1194	1.0000		
Model Chi-square		736.874	3	.0000		
Goodness of Fit		9.8338E+11	1194	.0000		
Classification Table						
Predicted		.00	1.00	% correct		
Observed	.00	1001	4	99.60		
Observed	1.00	24	169	87.56		
Overall				97.66		

The results of the estimation of this second model are contained in Table 5. All the estimated coefficients of the variables have the expected signs and are significantly different from zero (as shown in column Signif.). Looking at the R column, one can observe that the variable DAY has the most important partial explanatory contribution to the model. Notice that the other variables are significant, but their partial contribution to the model is less relevant. Finally, observe that the different measures of the goodness of fit of the whole model are satisfactory with the hypothesis that this model fits well the available data.

IV

Conclusions

This paper analyzes the main determinants of the use of different assets as media of exchange in Catalonia from 1844 to 1874. Our main hypothesis is that, during this period, the Catalan economy grew rapidly in absence of sufficient legal currencies. In this context, media of exchange other than coins and legal notes were used by economic agents to carry out their commercial exchanges. Thus, bills of exchange and other privately issued documents were used extensively as means of payment. Although bills of exchange did not have all the qualities that made them the most "natural" universally accepted medium of exchange, the fact is that the uncoordinated behavior of agents in their commercial relationships, resulted in the extensive circulation of those documents which were widely accepted by many firms as means of settling debts.

Our empirical analysis shows that main determinants for the acceptance of documents other than legal currency were, in the first place, the relative scarcity of universally acceptable legal currencies and, in second term, the particular characteristics of the commercial counterpart who passed the bill as payment of his debt. In particular, the acceptability of media of exchange other than legal money is very related to variables which are indicative of long-term commercial relationships and, consequently, higher levels of confidence and good reputation between trade partners. We have also shown what are the variables that affected the type of document which was accepted as medium of exchange. Signed documents were preferred in transactions involving big amounts and also when the date of payment was late enough with respect to the date of acceptance.

The number of suggestions for further research in these topics is very large. First, and from a theoretical viewpoint, it would be very interesting to introduce ideas of personal reputation in long-lasting commercial relationships in the context of the search-theoretical models of money. This seems to us the appropriate context in which episodes such as the one we report in this paper or the free banking regimes that were commonplace in many countries during the XIX century can be understood from an analytical perspective. Second, it is worth investigating whether the type of situation we report for Catalonia (and ASHTON (1945) describes for the case of the Lancashire) during this particular period is representative of the situation of the monetary market in other countries during the industrialization period. The availability of more and better data from individual firms seems a necessary condition to test whether bills of exchange (and similar documents) played an important role as media of exchange. Related with this last point, it would be very interesting to study time series

of currency supply to link them with the circulation of bills of exchange as money. This way one could, for instance, try to understand whether bills of exchange were more easily acceptable when currency was relatively more scarce. One could test in this fashion whether there is a mechanism built in the economy that allows it to create its own supply of media of exchange, partly independent of the creation of currency. It appears appropriate to reformulate the concept of monetary supply and its part on the analysis of industrialization and economic growth. We believe we have given some evidence that traditional measures of monetary supply may be too narrow. Related to this last point, the role of monetary restrictions in economic growth should be revised because our analysis seems to suggest that agents may be able to overcome this type of constraints. We do not know whether this system of exchange, partly based on the circulation of privately issued documents such as bills of exchange, was very efficient compared with an alternative system based on fully available universal media of exchange. These and related questions can only be answered by considering a theoretical model of monetary exchange which examines the possible welfare gains of loosening monetary constraints. Third, we think that explanations of price stability in the Spanish economy at the time which are based on arguments such as bimetallism need careful reexamination under the light of the arguments of this paper. All these considerations are, however, left to further research.

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