A Twin Crisis with Multiple Banks of Issue: Spain in the 1860s

Alessio Moro[1]
University of Cagliari

Galo Nuño
European Central Bank

Pedro Tedde
Banco de España

Abstract

We create new datasets on capital flows and bank balance sheets to document how the Spanish crisis of the mid-1860s fits the main characteristics of a twin crisis. Next, we describe the particular banking system of Spain, characterized by the coexistence of the Bank of Spain with multiple local banks of issue and a number of joint-stock banks (*sociedades de crédito*). We analyze the microeconomic behavior of each bank and find that, overall, the banks of issue performed well during the crisis. By contrast, the crisis had a dramatic impact on the *sociedades*, most of which suspended payments.

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1. Introduction

This paper analyzes an early example of a twin crisis, which occurred in the mid-1860s in Spain.[2] Between 1863 and 1867 the Spanish current account reversed from around -5 percent of GDP to nearly zero and the Spanish economy was hit by a currency crisis and a severe banking crisis, with roughly half of Spanish banks going bankrupt and GDP falling by more than 10 percent in 1868. The financial structure of Spain at the time makes the episode particularly interesting. This period was characterized by the coexistence of the Bank of Spain with other local banks of issue in a system of fractional-reserve banking.[3] In addition, there were a number of non-issuing joint-stock banks, called *sociedades de crédito*, oriented to providing credit for investment projects (mainly railways).

The Spanish crisis of the 1860s has been previously studied in the literature. However, no study has investigated the twin-crisis nature of the episode. This is possibly due to the lack of models of twin-crises, which have been developed only recently, or to a lack of relevant data. With this paper we try to fill this gap by providing a comprehensive description of the Spanish crisis through the lens of the most recent theoretical models of international financial crises, e.g. Gertler, Gilchrist and Natalucci (2007), Mendoza (2010) and Korinek and Mendoza (2013), among others. To do this, we reconstruct series for the capital and the current accounts and collect data on the balance sheets of several *sociedades de crédito*. Together with the data provided by Schwartz (1970) on the banks of issue, we are able to analyze annual information about the balance sheets of more than 20 financial institutions. To our knowledge, we are the first to provide such a complete characterization of the Spanish crisis, with a comprehensive analysis of the currency crisis and the sudden stop of capital inflows at the macro level and the banking crisis at the micro level.

Previous contributions focus either on internal or external factors to explain the crisis. Tortella (1969, 1970, 1973) suggests that domestic factors, especially the low returns in the railway sector, were the main cause of the crisis.[4] According to this view, the inability of railway companies to repay their debts weakened banks' balance sheets, forcing them to contract the amount of banknotes and credit. The contraction in credit, especially agricultural credit, would be at the basis of the

[2] The term "twin-crisis" is commonly used to indicate a banking crisis occurring together with a currency crisis, as in Kaminsky and Reinhart (1999). Twin crises are often associated with a sudden stop of capital inflows.
[3] Spain had a bimetallic standard in which the unit of account was defined in terms of quantities of both gold and silver. The unit of account was the *real* until 1868 and the *peseta* thereafter.
[4] He also acknowledges the importance of the international context, especially the rise in cotton prices due to the Americal Civil War and the panic of 1866, but gives it a secondary role.

agrarian crisis discussed in Sánchez-Albornoz (1977). In contrast, other authors such as Sardà (1948) and Fernández-Pulgar and Anes-Álvarez (1970) mention the international financial crisis of 1864-66 as the main driver of the Spanish one. This was a major crisis that affected most European economies and provoked financial panics in Paris and London that spread to other countries in Europe. This view is shared by Kindleberger and Aliber (2005), who support the idea that the 1864-66 financial crisis was a Europe-wide event rather than a collection of crises triggered by domestic factors in each country.[5] In this paper we reconcile both views by considering the mechanics of a typical twin-crisis with a sudden stop.[6] Our paper also contributes to the study of financial crises in a historical context: Schnabel (2004) studies the 1931 crisis in Germany while Accominotti (2012) studies the contemporaneous crisis in England. Schnabel and Shin (2004), instead, focus on the crisis of northern Europe in 1763.

We begin our analysis by considering the current and capital account series. During the decade prior to the crisis there was a large volume of capital inflows directed towards the nascent railway sector. In 1864 a sudden stop occurred, due to the rise in international interest rates during the international financial crisis of 1864-66. Also, between 1864 and 1866 there was a decline in the stock of metallic currency in the country of 3 percent each year which indicates, together with the *de facto* fixed exchange rate regime, the occurrence of a currency crisis.

Next, we use the balance sheets of the banks of issue and the *sociedades de crédito* to investigate the transmission of the international crisis, following the theoretical models of financial crises mentioned above. We show how the rise in international interest rates that began at the end of 1863 forced Spanish banks to increase their discount rates in order to avoid losing their metallic reserves. The rise in rates depressed asset prices, in particular railway company stocks, producing major losses to the *sociedades*. A large number of these institutions suspended payments, and this produced a collapse in credit, imports and economic activity. We find that the factor which best predicts whether a *sociedad* would collapse during the crisis is a low pre-crisis liquidity ratio.

[5] Hawtrey (1919) is the first to discuss the links between the international crisis and the Spanish one.
[6] Other studies of the Spanish economy in the 1856-1874 period are Martín-Aceña et al. (2012) and Tedde (1999, 2004, 2006, 2014), who provide a careful description of the history of the Bank of Spain, Sánchez-Ballesta and Bernal (2010) and Blasco and Sudriá (2010), who focus on the regional banks of issue, with emphasis on the Bank of Barcelona and Tedde (1978), who analyzes the railway sector in detail. Prados de la Escosura (2010) also documents the sudden stop, but his estimates of the capital account are based on mint data, which by definition do not allow for outflows of specie (see section 4 below).

The banks of issue managed to perform significantly better than the *sociedades* during the crisis. Only six out of twenty-one collapsed, and three of these six were opened at the beginning of the crisis and never managed to begin operations. The resilience of the banks of issue was due to their different business model, compared to that of the *sociedades*, their activities mainly being focused on bill discounting and commercial credit. The bankruptcy of two of the failing banks (Sevilla and Valladolid) can be traced to a deviation from this business model, through their involvement in the financing of the *sociedades de crédito* in their respective cities, which meant they were dragged down by the failure of the *sociedades*. We also document how in some cases, such as Barcelona and Bilbao, there were *flight to quality* effects; depositors transferred their deposits from the local *sociedades* to the banks of issue as the latter were perceived to be safer than the former.

The foreign exposure of the Spanish banking sector was limited to the capital concentrated in the three largest *sociedades*. Of these three, only one collapsed during the crisis, compared to nine out of ten with domestic capital. The conclusion here is that foreign exposure, in the form of equity rather than debt, is not to be blamed for the severity of the banking crisis in Spain. On the contrary, it provided stability to the few institutions that enjoyed it. This result complements that in Schnabel (2004), who concludes that the high level of foreign debt in the banking sector was a key determinant in the German twin crisis of 1931.

Finally, the Bank of Spain had a behavior that clearly contrasts with that of the other banks of issue. Its balance sheet was larger than the aggregate balance sheet of the other issuers and a major share of its operations was focused on providing credit to the public sector. We have reconstructed the quarterly balance sheet of the Bank of Spain and analyzed how, during the crisis, its metallic reserves fell in parallel with an increase in the volume of banknotes. The reason is the expansion in its operations with a government on the brink of default. This involvement with the government led to major distrust in the solvency of the Bank of Spain and its banknotes traded at a discount. The Bank of Spain survived due to an increase in its capital and the help of several international lenders. Our analysis also shows how the Bank of Spain did not act as a lender of last resort. This behavior is in contrast to that of the Bank of England and the Bank of France, which conducted lender-of-last-resort operations during the same international crisis.[7]

[7] See Bignon, Flandreau and Ugolini (2012) and Flandreau and Ugolini (2011). Kindleberger (1984) also discusses the lack of a lender of last resort in this episode.

The remainder of the paper is organized as follows: Section 2 describes the main features of the Spanish financial and economic system of the time; Section 3 briefly summarizes the international financial crisis of the years 1864-1866; Section 4 analyzes the currency crisis and the sudden stop in capital inflows; Section 5 focuses on the banking crisis in Spain. Section 6 then discusses the microeconomic behavior of the banks of issue during the crisis, while Section 7 is devoted to the analysis of the Bank of Spain. Finally, Section 8 concludes.

2. The Spanish economy in the early 1860s

In the mid-19th century, Spain was a predominantly agrarian economy; the industrial working population accounted for only 17% of the labor force.[8] In the period 1854-1856, a liberal government headed by Baldomero Espartero passed a series of new laws aimed at modernizing the Spanish economy. The first law, known as the Disentailment Law (*Desamortización General o de Madoz, 1855*), expropriated and auctioned off lands of the Catholic Church, the State and the local governments. Some of the previous owners of these lands, like the church and the local councils, were compensated with public debt.[9] The total amount raised by the sale of public and church properties was nearly 1,960 million pesetas, equivalent to one-third of the Spanish GDP of 1860.

The second law was the General Railway Act (*Ley de Ferrocarriles, 1855*). This law provided for state aid and reduced the administrative burden for building railway lines in Spain, allowing foreign investment in railway companies, exempting imports of iron, machinery, wagons and other transport equipment from customs duties, and providing for a public subsidy of up to one-third of the construction costs. Prior to 1855, only 440 kilometers had been constructed in Spain; from 1856 to 1866, more than 4,300 kilometers were opened to traffic.

The third law, the Credit Company Act (*Ley General de Sociedades de Crédito, 1856*), defined the conditions for the establishment of *sociedades de crédito*, that is, investment banks similar to the recently created *Crédit Mobilier* in France and the English joint-stock banks. A joint-stock bank was a new form of financial enterprise to furnish funds for new enterprises upon pledge of their stock. For example, a proposed railway did not have to await the slow process of placing its stock and bonds among investors, in order to obtain funds to begin construction, but would deposit these

[8] See Perez-Moreda (1985, pp. 25-61) and Carreras and Tafunell (2010).
[9] The proceeds of all these disposals were received by the Treasury as extraordinary revenues during the years that this process lasted. In fact, the sale of public and church properties was not completed until almost the end of the century, due to the magnitude of the transactions.

securities with a joint-stock bank, which would agree to accept its debts for a specified sum. These *sociedades* were able to sell their own shares and thus obtain the funds to make advances to the railways companies. In addition, the principle of limited liability reduced the risks for stockholders.

The last of the liberal laws was the Bank of Issue Act (*Ley de Bancos de Emisión, 1856*). At that time, there were three banks of issue in Spain: the largest and oldest, the Bank of San Fernando, and those of Barcelona and Cadiz. The law renamed the Bank of San Fernando as the Bank of Spain and allowed the establishment of local banks of issue in each Spanish city where there were no existing branches of the Bank of Spain. These new banks had a monopoly of issuance in their cities. The law also granted the Bank of Spain the issuance monopoly in Madrid and in any place where no bank of issue was to be created. Before 1874 the Bank of Spain only took the opportunity of opening local branches in two cities: Valencia and Alicante. With respect to the volume of issuance, the law entitled new and old banks of issue to issue banknotes in a volume of less than three times the amount of their metallic reserves, as under the 1851 law. The novelty was that the volume of banknotes was now limited to three times the amount of the initial capital, that is, a threefold expansion from the existing situation. Finally, the Government was responsible for appointing the Governor of the Bank of Spain and those of the other banks of issue.[10]

With the 1856 legislation the number of banks of issue grew from three (Bank of Spain, Barcelona and Cadiz) to 11 in 1861 and 21 in 1864. Similarly, 12 *sociedades* were created in 1861 and 34 in 1864. The main business of the *sociedades* was to channel domestic and foreign funds towards new railways venture.[11] Despite the fact that the *sociedades* were not entitled to issue banknotes, they issued short-term bonds that in many cases played a similar role. In the case of the banks of issue, their main business was bill discounting and commercial credit. The main exception was the Bank of Spain, which is described below.

3. The international crisis of 1864-6

Starting in 1864, a severe economic crisis affected most European economies. The crisis was preceded by a tremendous expansion in money and credit in the late 1850s and early 1860s due to the emergence of joint-stock banks. The introduction of joint-stock banks in France motivated some

[10] This system had some similarities to "free banking" systems. For a description of proper free banking systems, see Selgin (1988) and Selgin and White (1994).
[11] Only *Crédito Mobiliario Español* and *Compañia General de Crédito* had some investments in industrial activities, such as mining and gas, but the amount was tiny compared to their investments in railways.

legal reforms in England and Spain. The Joint Stock Companies Act of 1856 and the Companies Act of 1862 in the United Kingdom, and the already mentioned *Ley General de Sociedades de Crédito* in Spain, introduced this new form of banking into these countries. In the first half of the 1860s, the increase in leverage made possible by the emergence of joint-stock banks fuelled a European surge in cotton prices and, to a lesser extent, a boom in railways. Cotton prices increased fourfold from 1860 to 1864. The rise in cotton prices was a consequence of the American Civil War (1861-1865), which caused the blockade of the Southern ports. This reduced the supply of cotton for European mills, producing a rise in cotton imports from Eastern countries.

In 1864, the economic climate became more uncertain due to the troubles in European politics caused by the Prussian hegemonic policy. The Bank of England aggressively raised its discount rate in November and December 1863 and a banking panic occurred in Paris in January 1864. The Second Schleswig War between Prussia and Denmark began in February of the same year. The international turmoil was followed by a flight into safe assets such as gold, which forced the main central banks in Europe to raise interest rates again in order to avoid running out of metallic reserves. From October 1863 to October 1864, the discount rate of the Bank of England was raised from 4% to 9%. The Bank of France raised its discount rate to 8% and purchased bullion in the amount of 221 million francs. The abrupt tightening of monetary policy amid a climate of pessimistic expectations caused a collapse of cotton prices and a stock market crisis in most of the continent.

The international situation seemed to be back under control in 1865 and the Bank of England reduced its discount rate back below 4% during the summer. But in 1866, another huge shock disturbed the financial economy in Europe, especially in the United Kingdom, when the bank Overend, Gurney & Co. suspended payments on May 10th 1866 and went into liquidation in June. On May 11th, known as *Black Friday*, Lombard Street witnessed a stock market collapse and a banking panic with crowds at the gates of the most reputable banks. This occurred amid a climate of pessimism due to the political situation in Central Europe, where the Austro-Prussian War was about to begin.

As in 1847 and 1857, the Chancellor of the Exchequer authorized the suspension of the Bank Charter Act of 1844 (‘the Peel Act’), thereby lifting the requirement for gold to strictly support the quantity of money in circulation, cent for cent. The temporary suspension of the Bank Charter Act allowed the Bank to act as a lender-of-last resort by facilitating paper money without restriction,

albeit with more severe conditions for credit advances. On May 12th, the Bank of England was authorized to supply an additional £4 million, not covered by gold reserves, at a discount rate of 10%.[12]

The Bank of England kept its discount rate at 10% from May 11th to August 6th. Several banks and companies went bankrupt during this crisis. The result of this chain of bankruptcies was a second wave of monetary tightening in 1866 that severely affected the already weak health of banks and firms, not only in England, but also in continental Europe. In Italy, for instance, the Government introduced the *corso forzoso* on May 11th, which represented a suspension of the convertibility of the *lira* into gold and an additional supply of 250 million lire by the Bank of Italy. Similar situations existed in Prussia, Austria and Russia.[13]

4. The sudden stop and the currency crisis

In this section we document how the Spanish economy experienced a currency crisis and a sudden stop in parallel to the international crisis (1864-66). To this end, we first construct a series of the capital account balance of the Spanish economy for the period. The methodology and sources are discussed in Appendix A. Using this information we reconstruct the current account balance, which appears in Figure 1. This figure shows a large increase in the current account deficit from 1860 to 1863 followed by a sudden contraction from 1864 to 1867. The deficit peaked at around 4.5 percent of GDP in 1863 and shrank to zero in 1867.[14]

Figure 2 displays the inflows of foreign capital into the Spanish economy. From 1856 to 1863, an average of 155 million *pesetas* (2.6 percent of GDP) entered the country every year. Most of this money was channeled into the railways sector or into the *sociedades de crédito*, which typically reinvested funds in railways. This process came to an abrupt end in 1865. That year net capital inflows were only 27.2 million *pesetas* (0.4 percent of GDP), and they kept falling to reach the meager amount of 10.1 million *pesetas* (0.2 percent of GDP) in 1866, with a slightly larger amount, 21 million *pesetas*, recorded in 1867. Figure 3 displays our estimate of the capital account. The figure shows a sudden reduction of capital inflows during the crisis, from around 3.5 percent of GDP to almost zero. The subsequent large spikes in capital flows in 1868, 1872 and 1873 are due to new issues of public debt. Prados de la Escosura (2010) also suggests that a sudden stop occurred

[12] See Flandreau and Ugolini (2011).
[13] Kindleberger and Aliber (2005, p. 117).
[14] GDP data come from Prados de la Escosura (2003).

during the crisis. However, his estimates are significantly different from the ones provided here. This is because Prados de la Escosura constructs the capital account balance by adding the negative of the current account balance to the increase in foreign reserves, computed from yearly estimates of the stock of gold and silver.[15] Such estimation largely depends on the reliability of the data on the stock of gold and silver. As these are based on mint data, they suffer from the drawback of ignoring the possibility of reductions in the stocks of gold and silver due to metallic outflows.

Figure 4 displays a breakdown of payments to foreign capital. Although payments on railway investments were negligible in 1856, in less than eight years they grew to a volume equivalent to that of debt service. Total payments as a percentage of GDP fell in 1864, recovered in 1865 and then declined until 1867, booming thereafter due to public debt. By combining the capital and current account estimates, Figure 5 displays the evolution of the changes in the stock of metallic currency and compares it to the estimation by Tortella (1982), based on mint data.[16] In contrast to our estimation, the mint data are fairly stable and (by definition) never display negative changes. The mint-based estimation is in clear discrepancy with the assessment by observers at the time, such as Vázquez-Queipo (1861) or Santillan (1865), who were quite concerned about the outflow of specie from Spain. Barthé (1908) estimated that between 1856 and 1866 there was a net outflow of silver of 308.6 million pesetas. We discuss this issue in Appendix B.

According to Kaminsky and Reinhart (1999), currency crises are typically characterized either by abrupt changes in the exchange rate, which is officially or unofficially held fixed before the crisis, and/or by massive losses of foreign-exchange reserves by the central bank in its attempt to defend the fixed exchange rate. Before investigating these channels in the context of the Spanish crisis a couple of points should be made. First, Spanish banknotes were convertible into a certain amount of gold or silver, established by law. Thus, this system was similar to a *gold-standard*, in which fluctuations in the exchange rate occur around the *gold points*.[17] Second, there was no central bank authorized to defend the parity, but as all the banks of issue were implicitly obliged to ensure the convertibility of banknotes into specie, they were also *de facto* forced to defend the fixed exchange rate with gold and silver imposed by the law. In this environment, outflows of reserves were to be expected during a currency crisis, but large fluctuations in the exchange rate were not.

[15] The stock of gold and silver for 1850-73 comes from Tortella (1982). The data is reproduced in Martin-Aceña and Pons (2005), pp.678-0.
[16] We take the stock of metallic currency in 1874 and then proceed backwards using the net change in reserves associated with our estimation of the current and capital accounts.
[17] As the system was a bimetallic one, the "points" were determined in each moment by the cheapest metal (gold or silver).

Figure 6 displays the exchange rate of the Spanish peseta versus the pound sterling and the French franc between 1863 and 1866. During this period the peseta depreciated against the pound by 2 percent, with the depreciation against the franc being even smaller. Thus, the exchange rate channel does not display clear signs of a currency crisis. In contrast, the reserves channel supports the view that a currency crisis indeed took place. The estimation of the stock of metallic currency reported in Figure 5 shows that between 1863 and 1866 there had been a large outflow of reserves, followed by a strong build-up after the crisis years (1867-1869). Thus, even in the absence of a central bank authorized to defend the parity, the outflow of reserves from the country suggests that the characteristics of a currency crisis with multiple banks of issue are similar to those observed in more recent crises.

5. The Banking Crisis

Having shown how the Spanish economy was affected by a currency crisis and sudden stop in the period 1864-1866, in this section we discuss the links with the banking crisis that occurred in Spain in the same years. In order to analyze the banking crisis, we have reconstructed the balance sheet of all the banks of issue and of the largest *sociedades de crédito*.[18] This information covers more than 75 percent of the banking sector as measured by capital.

Table 1 shows how the number of banks (both banks of issue and *sociedades de crédito*) peaked in 1865, at 56 institutions, and then began to decline. In 1869, 27 banks were officially closed, almost half the total number. Although the official closure of the banks took place in the years 1867-89, most of them had already suspended payments in the period 1864-1866.

Table 2 presents the balance sheet of one of the largest *sociedades de crédito*. On the assets side it includes metallic reserves, discounted bills and public debt and investments in railways. The liabilities include current accounts and other types of debt. Compared to the complexity of banks nowadays, this balance sheet looks like a textbook example.

In order to understand the origins and propagation of the crisis, we draw from the most recent macroeconomics literature. In particular, we analyze whether the Spanish crisis of 1864-66 involves

[18] For data sources, see Appendix A.

a sequence of events comparable to those implied by the twin-crisis models presented in Gertler, Gilchrist and Natalucci (2007), Mendoza (2010) and Korinek and Mendoza (2013). Although these papers differ in some technical details, they all provide a common framework to understand sudden stops and financial crises, as summarized in Figure 7. In such models, the origin of the crisis is typically assumed to be a shock that is exogenous to the small open economy under analysis, namely a rise in the international interest rate. In a system of metallic convertibility a rise in world interest rates forces the small open economy (such as Spain was at the time), to raise its interest rates in order to avoid losing all its gold and silver reserves. The rise in domestic interest rates has two main effects on the economy. On the one hand, the rise in discount rates depresses asset values, such as stock prices, and reduces the profitability of leveraged intermediaries because it reduces the value of collateral and increases the cost of funding. In the presence of any financial friction, such as imperfect information or debt limits, these intermediaries are forced to reduce credit and to sell some of their assets in order to reduce their leverage. However, the simultaneous selling (fire sales) of assets has the effect of depressing asset prices even further, fostering a loop that is commonly referred to as the "financial accelerator". Therefore, the initial rise in interest rates produces a collapse in asset prices and credit. On the other hand, the rise in interest rates, by increasing the cost of capital depresses economic activity as a whole, and thus imports and credit demand too. The fall in economic activity also reduces the profitability of firms and banks. Finally, the fall in imports and the collapse in credit explain the abrupt correction in the current account and the outflow of metallic currency (the sudden stop and the currency crisis).

This framework fits the description of the events in Spain in the period 1864-1866 well. Figure 8 shows the evolution of discount rates at the Bank of England, Bank of France and Bank of Spain. In the autumn of 1863 there was a general increase in interest rates, which reached an initial peak in October 1864. After that, there was a progressive relaxation in 1865 and, in the case of the Bank of England, a net increase during the Overend, Gurney and Co. crash of 1866. The Bank of Spain's discount rate follows a similar pattern, except that the bank was not able to reduce rates in 1865, that is, it was forced to maintain a high rate of 9 percent during the entire period from October 1864 to September 1866. Note that the Paris and London markets represented the bulk of European financial markets at the time, thus we can safely argue that the international interest rate was determined in England and France.[19]

[19] Flandreau (1999).

The increase in interest rates depressed asset prices. As described in Sanchez-Albornoz (1967), the stock prices of the Spanish railway companies on the Paris stock exchange collapsed by more than 50 percent in the period 1864-1866. The fall in the value of the assets alerted depositors, who demanded the reimbursement of their deposits, forcing many of the banks to suspend payments. One of the first defaults was that of the *Compañía General de Crédito* (CGC), a *sociedad de crédito* that suspended payments in October 1864.[20] More than 85 percent of its assets were railway investments in the Sevilla-Jerez-Cadiz and Merida-Sevilla lines. Rumors were rife about the weak state of the balance sheets of most banks. As regards economic activity, 1865, 1867 and 1868 were recession years, and the profits from the railways, associated with the overall economic activity in the country, declined in 1864-6 for most of the railway companies. Banks were then forced to improve their balance sheet position by selling assets and reducing the amount of credit. As a result of all this, several banks went bankrupt, entailing a further reduction in the supply of credit. The resulting corrections on the current and capital account have been described above.

Table 3 summarizes the information regarding aggregate measures of the financial sector and individual banks in 1863, the year before the crisis, and in 1866. The contraction in credit between 1863 and 1866 by the banks of issue amounted to 23 million pesetas, the total amount of credit falling from 191 to 168 million pesetas. In the case of the *sociedades de crédito* this number is more difficult to obtain as we lack the balance sheet of many of the defaulting banks after they suspended payments. An upper bound is to assume that once they declare bankruptcy they stop providing credit. In this case, the decline would be 63 million pesetas, from 257 to 194 million pesetas, and the total fall in credit would have been around 85 million pesetas, equivalent to 1.3 percent of GDP in 1866.

6. Microeconomic Analysis of the Banking Sector

The multiplicity of banks of issue offers an interesting natural experiment to understand the effects of the financial panic. In Table 3 we observe how the majority of the *sociedades de crédito* in the sample failed during the crisis: 10 out of 13. We find that the liquidity ratio, defined as metallic reserves over short-term liabilities, is perfectly correlated with the survival probability.[21] The *sociedades* with liquidity ratios larger than one survived the crisis whereas those with ratios below

[20] The *sociedad* was then officially liquidated in 1866.
[21] Short-term liabilities include short-term debt and, in the case of banks of issue, banknotes. Short-term debt includes current accounts, deposits and other short-term liabilities.

one failed. This supports recent research that shows how the likelihood of bank runs depends on the banks' liquidity.[22]

It is worth also exploring whether banks with a more international exposure were more affected by the crisis. In fact, as suggested in Schnabel (2004), high-levels of short-term foreign indebtedness of domestic banks can threaten the banking system when there is a sudden stop. Evidence based on the records at the time suggests that the operations and funding of most of the *sociedades de crédito* and banks of issue were local in nature. The banks were typically oriented to providing credit to local businesses or to engaging in investment projects (railways, industry or mining) in the regions in which they were located. The funding was also local and there was sometimes collusion, with the same group of local capitalists sitting on the boards of the bank of issue and the *sociedad de crédito*.[23] The main exceptions to that rule were the three largest *sociedades*: *Crédito Mobiliario Español* (CME), *Sociedad Española Mercantil e Industrial* (SEMI) and *Compañia General de Crédito* (CGC), which had a large share of international capital. Together with the Bank of Spain, they were the largest institutions in Spain with a combined capital in 1863 of 139.7 million pesetas. Our estimations suggest that all the foreign capital that flowed into the banking sector was concentrated in these three *sociedades,* while the rest of the banks were financed with domestic funds. Notice that two of these three, the CME and the SEMI, belong to the group of surviving banks. Indeed, the CME even increased the amount of its capital during the crisis. Thus, international exposure, in the sense of international funding, was not a factor of vulnerability during this crisis. As discussed above, the *sociedades de crédito* which survived are those with a liquidity ratio larger than one before the crisis. For the CME (founded by the Péreire Brothers) and the SEMI (property of the Rothschilds), a possible explanation for such ratio is that, being founded by expert bankers from other countries, the management of these institutions may have been more experienced than that of other *sociedades*. In any case, foreign capital does not seem to have been a factor of vulnerability for the banking sector.

In the case of the banks of issue, bankruptcies were less frequent. Out of 21 banks, only 6 closed. Of these, three (Burgos, Palencia and Santiago) are not of particular interest, because they were created during the crisis and did not even manage to properly begin their operations. The other three, Cadiz, Sevilla and Valladolid, failed for the following reasons. In the case of Cadiz, the bankruptcy was due to a concentration of bad loans in industry, especially wineries. In the case of

[22] See Kiyotaki and Gertler (2013) and references therein.
[23] The Law of Bank of Issue prevented foreigners from sitting on the boards of directors of the banks of issue, but allowed it in the case of the *sociedades*, which may explain why foreign capital was concentrated in the latter.

Sevilla and Valladolid, the reasons for the default were the links of the banks of issue to the *sociedades de crédito* in their respective cities, so that the failure of the *sociedades* dragged the banks of issue down with them. These links were due to the fact that several of the board members of the *sociedad* were also on the board of the bank of issue and so they had clear conflicts of interests.

In the spring of 1866 the Bank of Sevilla provided generous funding to the *Crédito Comercial de Sevilla* (CCS), against dubious collateral, including shares of the Bank of Sevilla itself. After the failure of Overend, Gurney and Co. in May 1866, the bank was forced to finance all its operations by issuing new banknotes, well above the level allowed under the 1856 Bank of Issue Act. At that point, it decided to suspend convertibility of its notes into specie and as a consequence banknotes began to trade with large discounts. In the case of the Bank of Valladolid, after successful development from 1859 to 1863, a number of decisions caused the collapse of the bank in 1865 when it absorbed most of the losses from the *Crédito Castellano* (CC) of the city of Valladolid, which had recklessly financed low return railway projects in the Alar del Rey-Santander railways (in the north of Spain). In this case the board members of the bank of issue committed fraud by making the bank cover the losses of the *sociedad*. The result was the bankruptcy of both institutions.[24]

The rest of the banks of issue managed to survive the crisis, irrespective of their liquidity, which in many cases was much lower than that of the *sociedades*. The Bank of Spain was the largest issuer and we devote the next section to a discussion of its performance during the crisis due to its particular involvement with the Government. In the case of the other issuers, especially those of Barcelona, Bilbao, Malaga, Santander and Zaragoza, there are a number of lessons that can be learnt from the crisis.[25]

First, there was a reduction in the leverage ratio of these institutions. The leverage ratio is defined here as assets divided by capital. The reduction is due both to the fall in credit (on the asset side) and the increase in capital in the case of Barcelona and Malaga. The reduction in leverage implies a fall in banknotes and deposits. The fact that bank leverage increases in economic expansions and declines during recessions appears to be a regular feature of modern financial systems.[26]

[24] Tortella (1973, chapter 7).
[25] The other issuers were created in the years of the crisis and did not manage to expand their operations much during it.
[26] Adrian and Shin (2010) and Nuño and Thomas (2013) document the pro-cyclicality of leverage in modern times in the United States and provide theoretical models that can account for this regularity.

Second, the contraction in banknotes is much larger than that in deposits. In fact, in several places such as Bilbao or Santander deposits increased during the period whereas banknotes declined. A possible explanation is that the increase in interest rates during this period made it attractive to deposit funds at institutions that were perceived as safe. The high interest rates made it more attractive to invest the funds in deposits rather than in banknotes.

Third, in cities in which the *sociedades de crédito* failed and the bank of issue survived, there may have been *flight to quality* effects. A flight to quality is defined as the reallocation of funds from banks with weak balance sheets (*sociedades de crédito*) to those with more solid balance sheets (banks of issue).[27] The banks of issue were typically perceived to be safer than the *sociedades* because of their tiny involvement in railway investments. In the case of Barcelona, despite the reduction in credit of 6.4 million pesetas, the Bank increased its banknotes and deposits by 20.7 million pesetas during the crisis. Most of these new funds were kept as metallic reserves, so that in 1866 it had more than 30 million pesetas in cash and its liquidity ratio had increased from 0.4 to 0.8. The increase in deposits and banknotes is similar to the amount of deposits in the two *sociedades* that failed in May 1866, the *Sociedad Catalana General de Crédito* (SCGC) and the *Crédito Mobiliario Barcelonés* (CMB), so it is not unconceivable that part of these deposits were redirected to the bank of issue and to the other (healthier) *sociedad*, the *Crédito Mercantil de Barcelona* (SCMB) which increased its deposits by 6.6 million pesetas.[28] There is also some evidence of this effect in the case of Bilbao. The amount of deposits at the two *sociedades* that suspended payments during the crisis was 3.4 million pesetas in 1863. The Bank of Bilbao increased its deposits from 1.59 million pesetas in 1863 to 3.72 million pesetas in 1866 and to 5.81 million pesetas in 1869, when both *sociedades* were bankrupt.

The case of the Bank of Barcelona is also interesting because this bank reduced its credit at the same time as it received new funds. There are two possible, complementary explanations for this fact. First, that the demand for credit had been reduced due to the fall in activity and the increase in interest rates. Second, that the managers of the bank decided to maintain high liquidity ratios as a precaution in case of further panic episodes.

[27] See Bernanke et al. (1996) for the original definition of flight to quality.
[28] This is in line with Blasco and Sudria (2010).

The analysis of the banks of issue suggests that these institutions managed their balance sheets successfully enough to allow most of them to survive a severe financial crisis. Note that this result does not have to be attributed to regulation, which limited the maximum of amount of banknotes to three times the metallic reserves. As Figure 9 shows, the banks always issued less than their regulatory limit. The only exception is the first year of the crisis, 1864, in which some banks hit the regulatory maximum, and breached it in the case of the Bank of Spain, due to the scarcity of reserves. [29]

7. The Bank of Spain during the crisis

From 1864 to 1866, the Bank of Spain not only restricted credit, but also massively contracted its banknotes and deposits, by more than 60 million pesetas. In this section we argue that the involvement of the Bank of Spain with the Government explains this behavior.

In the first place, notice that during the period 1856-1864 the Bank of Spain had become more involved in the financing of the Government. The various sovereign defaults of the previous decades, the last one being in 1851, had closed off access to the London and Paris markets for Spanish public debt. Thus, the Spanish Government had to rely more and more on the Bank of Spain to obtain resources to finance its program of subsidies to railway companies and its military expeditions. In 1864, the Government decided to directly involve the Bank of Spain in its policy of selling public properties (Ddisentailment). The sale receipts of the public properties were delivered to the Bank, which was in charge of their collection. For its part, the Bank of Spain created the Mortgage Bill (*billete hipotecario*), which was backed by those receipts. The whole amount obtained from the placement of the Mortgage Bills had to be transferred by the Bank to the Treasury.

The timing of the operation was quite unfortunate. It happened at the beginning of the crisis at a time when the public was demanding liquidity due to the uncertainty surrounding the balance sheets of many banks. In the case of the Bank of Spain, the suspicion that the Bank was excessively close to the Treasury, perceived to be on the edge of insolvency, produced a bank run in which the public summarily demanded the payment of their bills in specie. The situation of the Bank of Spain was untenable and the Governing Council of the Bank decided to limit the amount of banknotes that

[29] The other regulatory constraint, implying a maximum issuance of three times the capital, was never violated.

could be converted into specie each day. The response of the Bank was to ask for foreign credit in order to purchase bullion in international markets, to increase the discount rate in line with the Bank of England and the Bank of France and to delay convertibility of banknotes. In addition, it increased its paid-up capital from 30 million pesetas to 50 million pesetas within two years (1864-1865). Heedless of the dire situation of the Bank, the Government prevented it from selling part of its portfolio of public assets. The tension between the Government and the Governing Council of the Bank ended with the resignation of the Governor of the Bank of Spain in March 1866.

In the spring of 1866, the Government proposed to take a loan of 100 million pesetas from an English bank syndicate in exchange for the rights of banknote issuance for the whole country, that is, the suppression of the Bank of Spain and the rest of banks of issue and the creation of a new national bank of issue in the hands of the English bankers.[30] The plan was quite advantageous for the Government. First, it would reopen international capital markets to Spanish debt, as a major share of the loan was to be devoted to repaying foreign bondholders. Second, some of the funds could be used to resume the payment of subsidies to the railway companies, in an attempt to mitigate the effects of the crisis. Third, the burden of the costs was to be placed on the shareholders of the local banks of issue, which would suffer most of the losses, though they were going to receive shares in the newly created national bank as compensation. Thus, this operation should not be regarded as a financial rescue of the banking system, which the Government had apparently decided to let fall, but as a fiscal rescue of the Government itself. Although the directors of the Bank of Spain strongly opposed the operation, as it would have involved the Bank's bankruptcy, the operation was aborted only because of the failure of Overend and the financial panic of May 1866.

To analyze the behavior of the Bank of Spain quantitatively, we have reconstructed its quarterly balance sheet for the period from the first quarter of 1860 to the last quarter of 1869.[31] Figure 10 shows the main components of the assets. First, it is evident that the operations of the Bank were mainly devoted to providing loans to the Government. The volume of discounted bills or credit to the private sector is remarkably small when compared to the amount of public assets. Second, the share of public assets in the total assets of the Bank rises from 15.9% (23.7 million pesetas) in the last quarter of 1862 to 79.7% (173.8 million pesetas.) in the third quarter of 1864. This dramatic expansion was due, as explained above, to the sale receipts of public properties. The Bank managed to reduce its exposure to the public sector by 62 million pesetas between the third quarter of 1864

[30] In contrast to what is commonly reported in the literature, it is not clear that Overend, Gurney and Co. was the head of the syndicate. See Tedde (2014) for a discussion of the issue.
[31] For data sources, see Appendix A.

and the third quarter of 1865. However, due to Government pressures, the share of public in total assets never fell below 58% during the crisis.[32]

Figure 11 shows the main components in the liabilities of the Bank. In contrast to other major banks of issue, such as Barcelona, deposits fell abruptly at the beginning of the crisis due to the mistrust in the Bank's liquidity (and solvency). Instead there had not been a similar move in banknotes, which remained at high levels until mid-1865. However, this is due to the fact that deposits were typically reimbursed in the form of banknotes and the convertibility of banknotes into metallic was largely impaired by the Bank in 1864. Once the exposure to the public sector began to decrease in early 1865, the Bank decided to reduce the volume of its banknotes in order to improve its liquidity ratios, a process which was accelerated in 1866 after the banking panic of May.

The Bank of Spain provided no lender-of-last-resort assistance during the crisis. Before the crisis it had almost no business with the other banks of issue or with the *sociedades*, which were perceived as competitors, not as clients. In addition, as the Government never allowed the banks of issue to suspend convertibility, the Bank of Spain was not in a financial position to help any other institution.

Finally, we describe how the Bank managed to survive the crisis. First, the Bank managed to reduce the volume of banknotes from 75 million pts in the second quarter of 1866 to 45 in the last quarter of 1866. This reduction was mainly possible thanks to a contraction in credit to the private sector, which fell from 37 to 15 million pesetas during the period. In addition, the Bank had renewed in January 1866 a 12 million pesetas foreign loan with Baring´s and in September it signed a new loan with the House of Rothschild for the same amount.[33] The interest of both loans was 11 percent. The resignation of Alonso Martínez as minister of finance in the summer of 1866 was also very important for the Bank, as it put an end to the project to replace the Bank by a new single issuer with foreign funds. Evidence that the Bank had managed to successfully face the crisis is given by the price of its share at the Madrid Stock Exchange.[34] From mid-1864 to mid-1866 the shares of the Bank lost half of their value. After the bankruptcy of Overend and Gurney and the consequent abortion of the plan to substitute the Bank of Spain with the syndicate of English bankers, the value of the shares of the Bank started a sustained increasing trend, suggesting that the Bank was once again perceived as safe by the markets.

[32] Tedde (2014).
[33] Tedde (2014).
[34] Tortella (1983, p. 259).

8. Conclusions

In this paper we describe the twin-crisis that affected Spain in 1864-1866.To do this, we reconstruct data on capital inflows and on individual banks balance sheets. Such data allow us to show that the Spanish crisis fits the most recent theoretical models of twin-crisis with sudden stop. In this sense, we can conclude that the Spanish crisis of the time shares basically the same characteristics of twin-crisis observed in recent years.

Secondly, by reconstructing banks balance sheets representing around 75 percent of the financial system, we have been able to study the microeconomic behaviour of banks. We find that the banks of issue performed better than the *sociedades* during the crisis. Even if banks and *sociedades* had similar liquidity ratios in many cases, the business model of the banks was more conservative as they typically invested their funds in bill discounting and commercial credit, whereas the *sociedades* were engaged in riskier industrial projects, typically railroads. Among *sociedades*, only those with high liquidity ratios managed to survive. One reading of this evidence is that the banks of issue, having the privilege to issue liabilities with a low cost of funding (banknotes) engaged in low-risk activities whereas the *sociedades*, funded mainly through capital, where naturally engaged in riskier ventures in order to be profitable. Thus, this episode highlights how the cost of funding is key to determine the risk profile of a bank. Also, this conclusion is consistent with the fact that banks of issue had larger leverage ratios than the *sociedades*.[35]

Finally, this paper has shed some light in the behavior of the Bank of Spain during the crisis. This bank experienced more problems during the crisis than other issuers, such as the one of Barcelona. The main reason is the high involvement of the Bank with the Government, which prevented it from following a more sensible balance-sheet management and was about to produce its fall, were not for a certain dose of luck, with the collapse of Overend, and fresh capital from its shareholders and international bankers.

[35] Leverage is defined as the ratio of short-term debt plus banknotes, all divided by capital in table 5.

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Tables and Figures

Table 1. Number of joint-stock banks (banks of issue, *Sociedades de Crédito* and other institutions)

	Banks of issue	*Sociedades de Crédito*	Total*
1856	4	6	10
1857	9	6	15
1858	10	7	17
1859	10	7	17
1860	11	8	19
1861	11	12	23
1862	12	17	29
1863	13	20	33
1864	21	34	55
1865	21	35	56
1866	20	32	52
1867	20	26	46
1868	18	21	39
1869	15	14	29
1870	15	14	29
1871	15	14	29
1872	15	14	29
1873	15	13	28

Source: Schwartz (1970) and Tortella (1973, p. 9). Total includes other joint-stock banks but no *cajas de ahorros*

Table 2. Balance-sheet of the *Sociedad Española Mercantil e Industrial* (SEMI) in 1864. Million of current pesetas.

ASSETS		LIABILITIES	
Metallic reserves	2.9	Current accounts	2.9
Bills and public debt	7.9	Other	1.7
Stock and bonds in railways	8.0		
Other	1.0	CAPITAL	15.2
TOTAL	19.8	TOTAL	19.8

Table 3. Summary of the balance sheets of the main Spanish banks of issue and *sociedades de crédito* before and during the crisis. Million of current pesetas.

	Pre-crisis 1863					Crisis 1866				
	Capital	Credit	Short-term Debt	Bank-notes	Liquidity	Capital	Credit	Short-term Debt	Bank-notes	Liquidity
Sociedades de Crédito										
Madrid										
CME	91.2	97.5	1.5		1.9	114.0	113.8	1.2		1.3
CGC*	33.3	53.7	14.2		0.1					
SEMI	15.2	16.1	2.9		1.6	15.2	18.1			
Barcelona										
CMB*	10.5	14.4	6.1		0.4	12.0	14.2	3.4		
SCGC*	9.0	18.8	14.5		0.6	10.5	9.9	1.1		0.9
SCMB	3.1	1.2	0.9		2.2	6.2	19.1	7.5		0.3
Bilbao										
SCV*	1.4	2.9	1.7		0.7	3.0	3.9	1.9		0.6
SBC*	2.2	3.7	1.7		0.4	1.1	0.9			
Cádiz										
CGC*	1.2	6.4	4.1		0.2					
CCC*	1.0	15.3	13.6		0.1					
Sevilla										
CCS*	1.2	6.0	7.8		0.2					
Valencia										
SVCF*	4.0	14.9	13.1		0.2	5.3	14.6	9.9		0.1
Valladolid										
CC*	8.1	5.9	2.2		0.9					
Total Sociedades	*181.4*	*256.8*	*84.3*			*167.3*	*194.5*	*25.0*		
Banks of issue										
B. of Spain	30.0	113.4	56.8	68.3	0.2	50.0	106.1	18.0	44.6	0.3
Barcelona	5.0	15.5	6.8	8.9	0.4	7.5	9.1	16.9	19.5	0.8
Bilbao	2.5	7.1	1.6	6.4	0.3	2.5	6.4	3.7	3.0	0.4
Cadiz*	5.0	12.7	2.3	11.7	0.3	5.0	9.2	0.0	6.5	0.0
Malaga	2.5	7.8	2.0	6.0	0.4	3.1	6.2	1.0	5.8	0.3
Santander	1.8	4.5	1.6	1.9	0.2	1.8	5.1	3.4	1.1	0.2
Sevilla*	4.0	8.2	1.2	6.5	0.3	4.0	7.9	1.4	3.3	0.1
Valladolid*	1.5	3.5	1.0	1.3	0.4					
Zaragoza	1.5	11.3	0.3	3.1	0.6	1.5	5.4		1.0	0.7
Rest of banks	4.1	7.2	2.8	3.7		12.3	13.1	2.9	5.1	
Total without B.Spain	*27.9*	*77.8*	*19.5*	*49.5*		*37.6*	*62.3*	*29.3*	*45.2*	
Total Banks of issue	*57.9*	*191.1*	*76.4*	*117.8*	*0.3*	*87.6*	*168.4*	*47.3*	*89.8*	*0.5*
TOTAL	**239.3**	**447.9**	**160.7**	**117.8**		**254.9**	**362.9**	**72.3**	**89.8**	

Note: The mark * indicates that the institution suspended payments or was liquidated before 1870. Although profitable, SEMI closed in July 1868 because the Rothschilds decided to abandon the Spanish financial market. For this reason SEMI is not included in defaulting banks. In the case of the *sociedades de crédito* in which no data were available for 1866 we have employed data from 1867 or 1868.

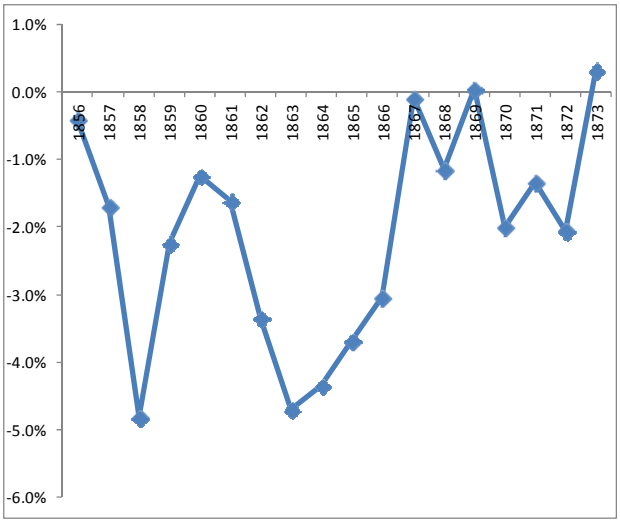

Figure 1: The current account balance (1856-1873) in percentage of GDP. Source: See the text.

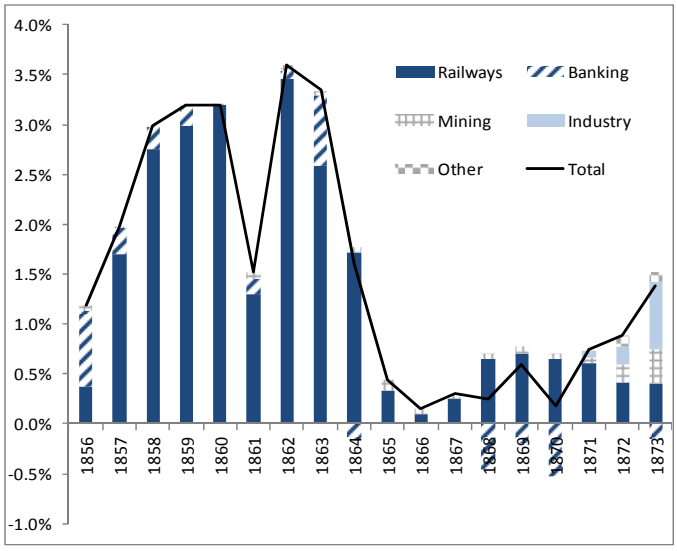

Figure 2: Entries of foreign capital in the Spanish economy (1856-1873), except public debt, in percentage of GDP. Source: See the text.

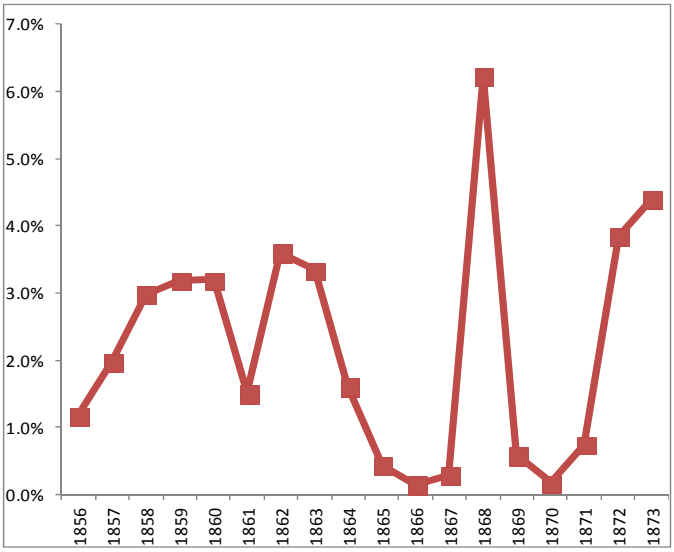

Figure 3: The capital account balance (1856-1873) in percentage of GDP. Source: See the text.

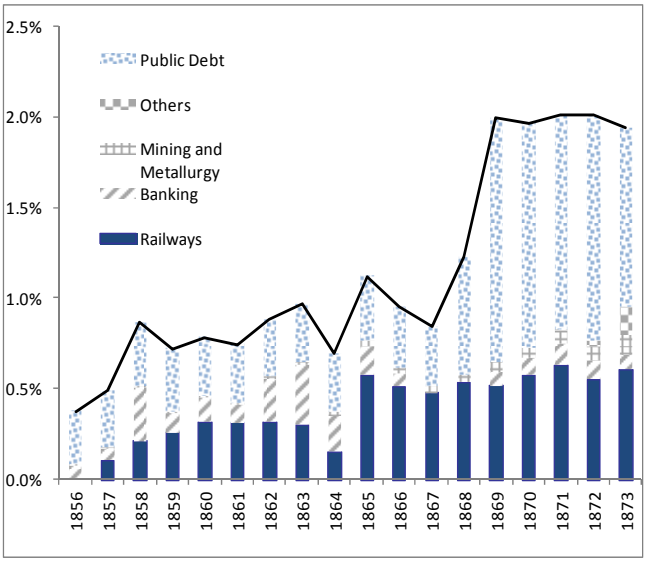

Figure 4: Payments to foreign capital of the Spanish economy (1856-1873) in percentage of GDP. Source: See the text.

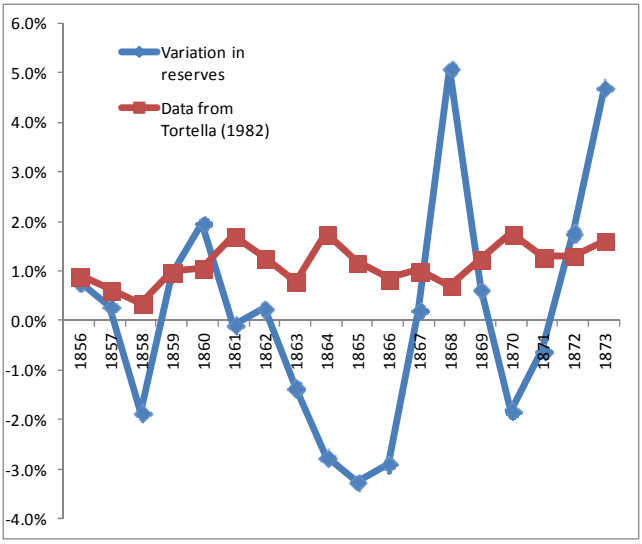

Figure 5: Variation in foreign reserves (1856-1873) in percentage of GDP. Source: See the text.

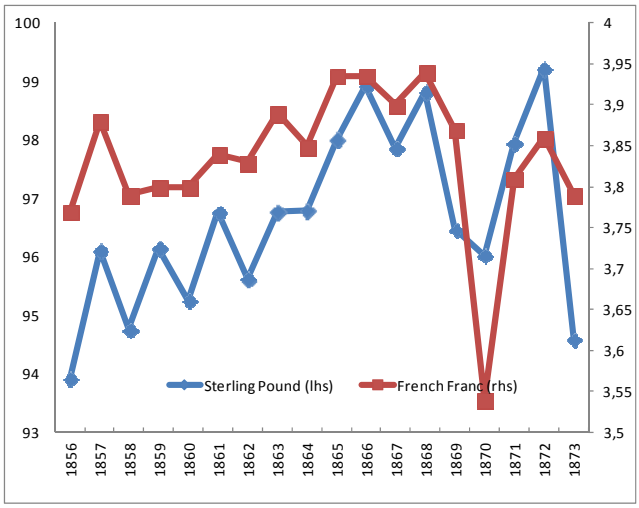

Figure 6: Evolution of the exchange rate of the Spanish *Real*. Source: Tedde (2014).

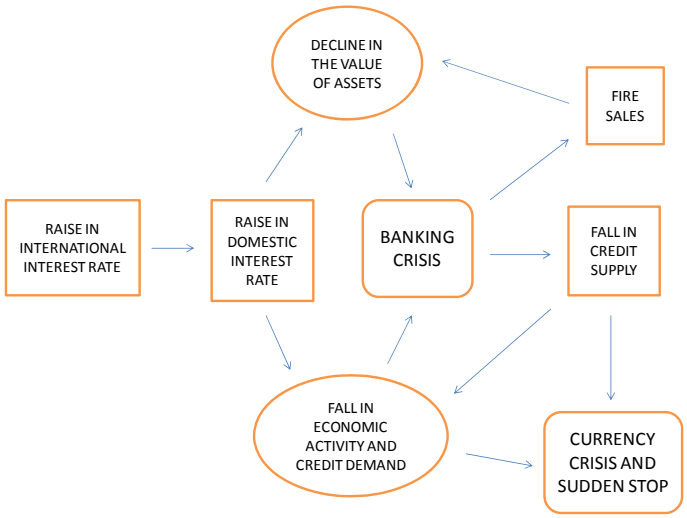

Figure 7: Scheme of a twin-crisis triggered by a rise in the international interest rate.

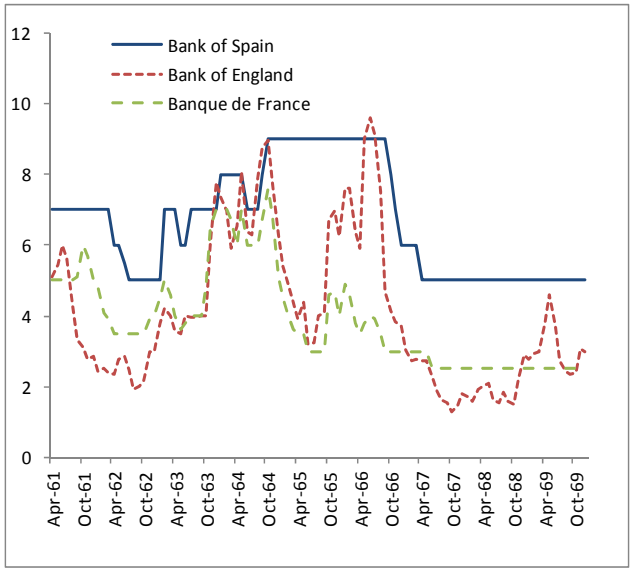

Figure 8: Discount rates (April 1861- December 1869).
Source: NBER Macrohistory database and Bank of Spain archives.

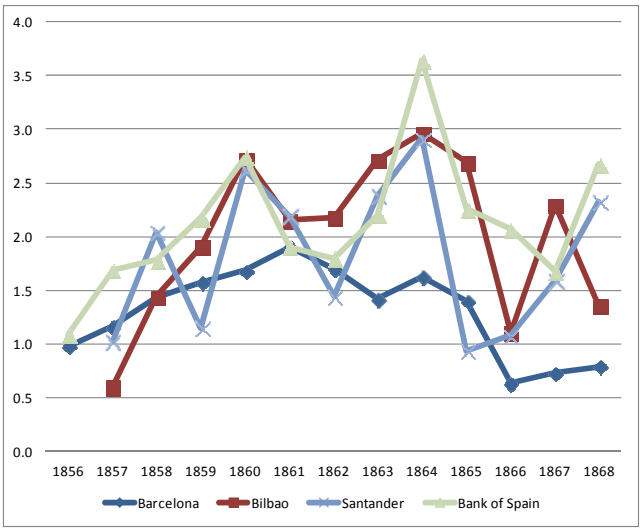

Figure 9: Ratio of banknotes over metallic reserves. Source: Schwartz (1970).

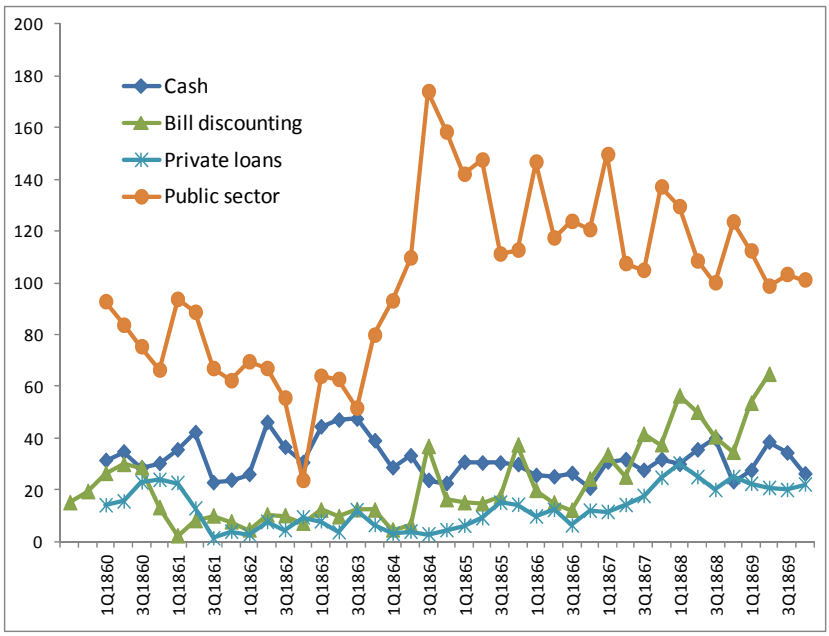

Figure 10: Bank of Spain's assets: main components. Millions of current pesetas. Source: Bank of Spain archives.

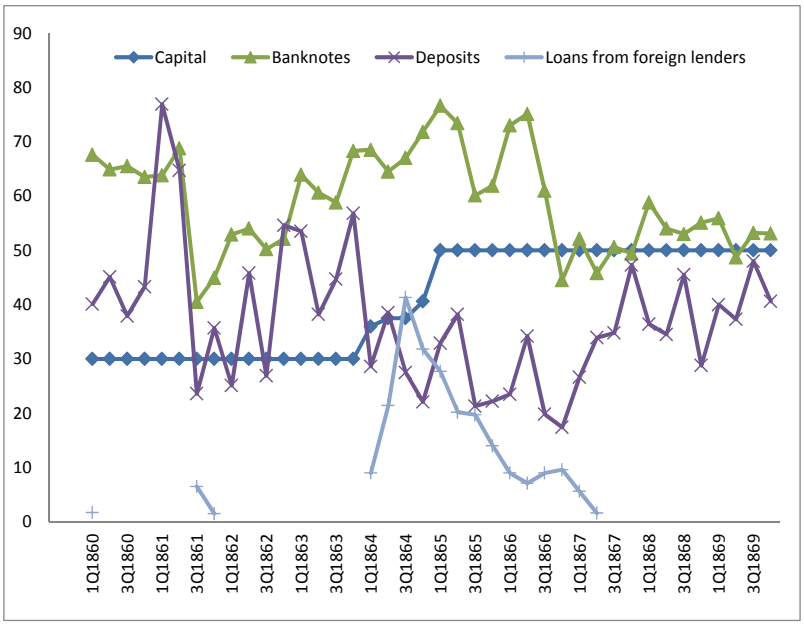

Figure 11: Bank of Spain's capital and liabilities: main components. Millions of current pesetas. Source: Bank of Spain archives.

Appendix A: Data sources

Net flows of foreign capital

Gross flows of foreign capital are taken from several sources. For data about railway investments, we have consulted: Broder (1976, 1981) and Tedde (1978, pp. 9-354). For banking investments, data have been collected from Sánchez-Albornoz (1977), Tortella (1973), Broder (1976) and Tedde (1974). The information about mining and metallurgy foreign investments come, for the British sources, from Stone (1999), Harvey (1981) and Harvey and Taylor (1987). The French and Belgian data are drawn from Broder (1976, 1981) and from Chastagnaret (2000). We also have consulted Tortella (2008). For new issues of Public Debt along the period 1868-1874 data are taken from Martín-Niño (1973) and Fernández-Acha (1976). The foreign investment data of public utilities, like light and water urban services, come from Stone (1999) and Costa-Campí (1982). These are all gross flows of foreign capital to the Spanish economy. However, we assume that there was no investment by Spanish residents in foreign countries and thus we set the gross outflows equal to zero in order to compute the net inflows.

Net payments to foreign capital

We estimate payments to foreign capital from several sources. As in the case of the capital flows, we assume that the net payments equal the gross payments to foreign capital, i.e., we assume no Spanish investments in foreign countries.

In the case of railways we use data from Casares-Alonso (1973) and Tedde (1978) to estimate the volume of shares in the hands of foreigners. We use data from the Ministry of Public Works (*Ministerio de Fomento*) to assess the volume and the payments of debt instruments. In order to estimate the proportion of foreign capital in these debt instruments and the dividend payments, we use the annual balance sheets of the two major railways companies, the *Compañía de Caminos de Hierro del Norte de España* and Madrid-Zaragoza-Alicante (MZA), and assume that all railways companies paid equal dividends and have the same share of foreign debt.

In the case of banking we assume that the profitability of all the three largest *sociedades de crédito* which were French, was the same of the *Crédito Mobiliario Español* (the largest one), of which we have data from Sánchez-Albornoz (1977).

For mining and metallurgy profitability, following Prados de la Escosura (2010), we have taken the relative information from Harvey and Taylor (1987), which contains averages of dividend and interest payments for British investments. We have assumed that it can be acceptable to apply this rate of return to the French and Belgian investments in the same industry. The French and Belgian data are drawn from Broder (1976, 1981) and from Chastagnaret (2000).

Data about repayments of public debt are taken from Fernandez-Acha (1976) and Martín-Niño (1973). We assume that the repayment of public debt by the Spanish Treasury was made by repurchasing bonds in the stock market at current prices. This hypothesis is backed by Artola (1986) and Comín (1988). Finally, for the public utilities investments we have applied the same real rate of return as in the case of public debt. [36]

Balance-sheet information

Data about the banks of issue come from their annual reports. It is the same as the data presented in Schwartz (1970). Data regarding the *sociedades de crédito* come from *La Gazeta de Madrid*, the official bulletin in which they were published, and are at yearly frequency. The acronyms for the *sociedades de crédito* in Table 3 and the years for which balance sheets are available are: *Crédito Mobiliario Español* (CME, 1856-1874), *Sociedad Española Mercantil e Industrial* (SEMI, 1856-1864 and 1867), *Compañia General de Crédito* (CGC, 1856-1863), *Crédito Comercial de Sevilla* (CCS 1862-1863 and 1865), *Crédito Castellano* (CC, 1861 and 1863), *Sociedad Catalana General de Crédito* (SCGC, 1856-1864 and 1867), *Crédito Mobiliario Barcelonés* (CMB, 1856, 1858-1864 and 1869), *Crédito Mercantil de Barcelona* (SCMB, 1863-1864, 1868-1869 and 1872-1874), *Sociedad Bilbaína de Crédito* (SBC, 1862-1863, 1865 and 1867), *Sociedad de Crédito Vasco* (SCV, 1862-1863, 1865, 1867 and 1869), *Compañia Gaditana de Crédito* (CGC, 1862-1864), *Crédito Comercial de Cádiz* (CCC, 1860-1864) and *Sociedad Valenciana de Crédito y Fomento* (SVCF, 1856-1859 and 1861-1870).

Appendix B: About the stock of gold and silver in Spain

One of the most complex questions that arise in the reconstruction of the monetary aggregates of the Spanish economy in the 19th century regards the amount of metallic currency. In spite of the availability of reliable estimations of the volume of banknotes and the deposits in the local banks of issue, there are no annual series of the stock metallic currency. A potential candidate, the "Foreign

[36] See Prados de la Escosura (2010, pp.12-13) to find a detailed description of his alternative methodology

Trade Statistics" (*Estadística del Comercio Exterior*) has been widely criticized in the literature as a valid estimation of the gold and silver flows.[37]

Tortella (1982) employs an alternative method to estimate the changes in the stock of metallic currency based on the sum of the net amount of gold, silver and copper minted every year. In order to compute the level of the stock, he chooses 1874 as the first year in which a reliable estimation of the stock exists and then proceeds backwards by subtracting the changes in the stock. This estimation has been accepted by Martin-Aceña and Pons (2005) in their statistical collection of Spanish monetary data and it is employed by Prados de la Escosura (2010) to compute the capital account.

Notwithstanding its appeal, the estimation based on mint data has an important drawback: as the amount of minted currency is always positive, this method implies that the currency stock is an increasing function of time. Therefore, the series of the stock of metallic currency grows steadily from 1833 to 1874. In the case of gold, for example, the estimated values are 392 million pets in 1833, 471 in 1855 and 1537 1873. In contrast, the more reliable data for the period 1874-1900, displays more than 22 years in which there were reductions in the amount of metallic currency in Spain.[38] This change in the trend casts some doubts about the reliability of the mint-based method.

In addition, the historical writings of several contemporary observers of the period 1856-1873 such as Vázquez-Queipo (1861) or Santillan (1865) seem to oppose the view of an ever-growing metallic stock in Spain. In fact, according to these authors, the instability in the metallic currency was a major problem of the Spanish economy. In this line, Barthe (1908) estimates that between 1856 and 1866 there was a net outflow of silver of 308.6 million pesetas. According to the records of Governing Council of the Bank of Spain, the scarcity of spice of the Spanish economy forced the Bank to purchase in Paris and London more than 360 million pesetas of gold bullion between 1859 and 1870. This amounts to roughly half of the total amount of currency minted during the period. The outflow of specie was not a particular problem of Spain. The American Civil War and the increase in cotton imports from Egypt and China as well as the growth in British investment in India induced an outflow of silver from many European countries, as described in Flandreau (1999).

[37] See Barroeta-Aldamar (1861), Tortella (1974) or Prados de la Escosura (2010).
[38] See Martin-Aceña and Pons (2005, pp.678-0).

In the case of Spain, the drain of specie should be of no surprise given the particular circumstances at the time. In the first place, the misalignment of mint rations between gold and silver compared to market ones induced the outflow of silver coins. In the second place, despite the large capital inflows in railways companies between 1857 and 1863, there was an associated outflow of currency to purchase large amounts of iron and machinery due to the tariff exemption included in the *Ley General de Ferrocarriles*. In addition, the foreign investments generated an outflow of currency in the form of dividends and interest payments.

Finally, it should be stressed that this criticism against the mint-based method does not mean a criticism of the mint data itself, but only of the validity of this data as a proxy of the changes in the stock of metallic currency. The underlying assumption in this method is that there was every year a net positive inflow of spice equal to the amount new coins minted. As an alternative, in this paper we reconstruct the changes in stock of metallic currency using information from the current and the capital accounts in order to compute the net change in reserves.

Additional Tables

Tables a and b report data appearing in figures 2 and 4 in the paper.

Table a. Entries of foreign capital in the Spanish economy (1856-1873). Million of current pesetas.

	Railways	Banking	Mining	Industry	Other	Subtotal	Public Debt	**Total**
1856	21.3	42.3	3.0			66.6		**66.6**
1857	92.0	14.2	0.3			106.5		**106.5**
1858	144.7	11.7	0.3			156.7		**156.7**
1859	167.8	10.7	0.4			178.9		**178.9**
1860	190.3		0.3			190.6		**190.6**
1861	79.3	9.5	3.5			92.3		**92.3**
1862	216	5.7	3.5			225.2		**225.2**
1863	170.8	45.6	3.5			219.9		**219.9**
1864	112.5	-10.5	3.5			105.5		**105.5**
1865	20.9		6.3			27.2		**27.2**
1866	6.6		3.5			10.1		**10.1**
1867	17.5		3.5			21.0		**21.0**
1868	38.8	-27.1	3.5			15.2	356.5	**371.7**
1869	38.8	-10.6	4.1			32.3		**32.3**
1870	38.8	-31.5	3.5			10.8		**10.8**
1871	38.8		4.3	4.4		47.5		**47.5**
1872	31.1		12.6	13.2	8.4	65.3	217.2	**282.5**
1873	31.1	-11.3	28	53	7.4	108.2	236.3	**344.5**

Table b. Payments to foreign capital of the Spanish economy (1856-1873). Million of current pesetas.

	Railways	Banking	Mining and Metallurgy	Others	Public Debt	**Total**
1850					50.3	**50.3**
1851			0.1		44.4	**44.5**
1852			0.1		43.2	**43.3**
1853			0.1		16.8	**16.9**
1854			0.2		16.8	**17.0**
1855			0.2		15.6	**15.8**
1856	-	3.9	0.6		16.4	**20.9**
1857	5.4	3.4	0.6		17	**26.4**
1858	10.9	15.5	0.6		18.4	**45.4**
1859	14.3	5.9	0.6		19.6	**40.4**
1860	18.7	7.9	0.7		19.3	**46.6**
1861	18.9	5.8	0.7		19.8	**45.2**
1862	19.6	14.6	1		19.9	**55.1**
1863	19.6	21.6	1.2		21.1	**63.5**
1864	9.8	13.0	1.5		21.1	**45.4**
1865	35.3	9.7	1.9		22.3	**69.2**
1866	33.6	4.9	2.2		22.3	**63.0**
1867	33.5		2.5		23.5	**59.5**
1868	31.7		2.7		38.7	**73.1**
1869	28.1	4.1	3		74.5	**109.7**
1870	34.0	5.6	3.3		74.5	**117.4**
1871	40.1	7.6	4.8	0.4	75.9	**128.8**
1872	40.2	7.6	6	2.1	91.5	**147.4**
1873	47.2	6.5	8.7	11.7	77.7	**151.8**
1874	48.9	14.0	9.9	20.8		**93.6**