Stock Market Crises and Macroeconomic Depressions in Spain, 1850-2020

Crisis bursátiles y depresiones macroeconómicas en España, 1850-2020

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Abstract

Stock market crashes have occurred very frequently in Spain. However, in the period 1850-2006, Spain had a lower probability of a depression being associated with a crash than in other countries, even though economic depressions were also common during the period. This result could be explained by the small size and low level of development of the stock market throughout most of this period. However, the probability rises when considering a longer period (1850-2018 and also until 2020), which includes the years of greater financial development and international integration. In this later period, Spain is more similar to other developed countries and stock market crashes seem to be more predictive of the prospect of a depression occurring, especially when the stock market crash is accompanied by a banking crisis. As a result, greater financial instability seems to be the main transmission mechanism between stock market crises and depressions.

JEL classification: E44, G01, N24.

Key words: Stock market crises; macroeconomic depression's; Spain.

Resumen

Las crisis bursátiles se han producido con mayor frecuencia en España. Sin embargo, en el periodo 1850-2006, España tuvo una menor probabilidad, que otros países, de que una depresión económica estuviera asociada a una crisis, a pesar de que las depresiones económicas también fueron comunes durante el periodo. Este resultado podría explicarse por el pequeño tamaño y bajo nivel de desarrollo del mercado bursátil durante la mayor parte de este periodo. Sin embargo, la probabilidad aumenta al considerar un lapso más largo (1850-2018 y también hasta 2020), que incluye los años de mayor desarrollo financiero e integración internacional. En este último periodo, España se parece más a otros países desarrollados y las crisis bursátiles parecen predecir en mayor medida la posibilidad de que se produzca una depresión, especialmente cuando la crisis bursátil va acompañada de una crisis bancaria. En consecuencia, una mayor inestabilidad financiera parece ser el principal mecanismo de transmisión entre las crisis bursátiles y las depresiones.

Clasificación JEL: E44, G01, N24

Palabras clave: crisis bursátiles; depresiones macroeconómicas; España.

Introduction

An interesting feature of Spain's financial crises from 1850 to 2020 is that most of them were multiple crises. Thus, previous studies on Spanish financial crises, such as those by Betran, Martín-Aceña and Pons (2012) and Betrán and Pons (2019) have considered currency, banking, the stock market, debt crises and combinations thereof. This represents a new approach relative to other studies that focus exclusively on banking and currency crises, a combination of the two, or debt crises alone. The high number of stock market crashes in Spain (13 out of 19 crises), the severity of some of them and the interconnections between different types of crises (Bordo & Eichengreen, 1999; Bordo & Meissner, 2011, 2016; or Reinhart & Rogoff 2009) have justified the inclusion of stock market crashes in long-term studies about Spanish financial crises. Indeed, underscoring the relevance of stock market crashes, between January 2020, when the first case of coronavirus was confirmed in Spain, and October 14th, 2020, the Spanish stock market index (IBEX-35) suffered more than the rest of world's indexes from the consequences of the COVID-19 pandemic[1].

After analysing the interconnections among different types of financial crises, this paper concentrates exclusively on those pertaining to the Spanish stock market. The objectives are twofold: firstly, to explain the main characteristics of Spanish stock market crashes in terms of frequency, duration and severity; and secondly, to analyse the matching of stock market crises and economic depressions. According to Barro and Ursúa (2008, 2017), who analyse links between stock market crises and economic depressions in 30 countries between 1870 and 2006, severe depressions usually coincide with stock market crises. This is the case of the 1918 flu pandemic and the Great Depression in the US. They also find that depressions do not usually occur without a stock market crisis. We replicate the analysis using Betrán, Martín-Aceña and Pons (2012) and Betrán and Pons's (2019) database for the Spanish economy that matches stock market crises and depressions. Our intention is to determine

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1   The Spanish stock market index (IBEX35) fell by -27.57% between January and October 14, 2020, in comparison to -1.67% in Germany (DAX), -21.31% in the UK (FTSE100), -17.34% in France (CAC 40), -26.90% in Italy (FTSEMIB), -17.53% in Portugal (PSI20), -11.88% in Mexico (BMV-IPC) and -14.99 in Brazil (BOVESPA). In the US (NASDAQ), it rose by + 31.16% (Investing.com 2020).

whether the general pattern derived from a large sample could be extrapolated to the Spanish case, considering that during most of the period Spain was a peripheral country with a small and underdeveloped stock market. We reach three main conclusions. Firstly, the frequency of stock market crises in Spain is higher than in the US, and the 30 countries (20 OECD) included in Barro and Ursúa's (2009) research. Secondly, despite the high frequency of Spanish financial crises in general, in the period 1850-2006 stock market crashes in Spain were less likely to be paired with a depression than in other countries, in line with Barro and Ursúa's results. Similarly, if a depression occurred, there was a lower probability of it coinciding with a stock market crash. This probability rises when considering the longest period (1850-2018), due to the higher level of development and integration of the Spanish financial sector from the 1970s onwards, and especially its greater international integration since 1990. Finally, this probability also rises when a stock market crisis is accompanied by other types of crises, mainly a banking crisis. As a consequence, it seems that the stock market crises increased financial instability and facilitated banking crises, giving rise to depressions.

The rest of the paper is structured as follows. Section 2 analyses the main transmission channels of stock market crashes to economic activity in order to gain a better understanding of how a stock market crash can generate a depression. Section 3 examines the characteristics of the main Spanish stock market crises and Section 4 studies whether stock market crashes could be predictive of depressions. The main conclusions are presented in the final section.

1. Stock market crashes and economic activity

Stock market crashes can have major economic consequences. We can consider three important transmission mechanisms: a wealth effect, expectations, and financial instability. The first is drawn from the literature that analyses the impact of the fall in the stock market prices on wealth (Poterba, 2000; Sousa, 2009). According to this literature, a falling stock market reduces stockholders' wealth, causing a decline in consumer spending and, consequently, in economic activity and employment. This relationship is linked to the life-cycle model (Ando & Modigliani, 1963), which considers consumption as a function of permanent income. As households can increase consumption by selling assets or borrowing using the assets as collateral, a decrease in wealth (in this case financial wealth) will reduce current and future consumption.

The wealth effect is likely to have played a more significant role in the most recent crises and in more developed countries with advanced financial markets and a higher degree of stock market capitalization, as reported by Boone et al. (1998) for the US and other G7 countries[2]. Although empirical findings are not conclusive, some authors such as Duca (2001) and Chodorow-Reich et al. (2019) for the US, or Sousa (2009) for the Euro zone, found evidence of the influence of stock wealth on consumption and unemployment. Additionally, the wealth channel is even more difficult to identify in developing or emerging countries due to the less developed equity markets (given the smaller size of stock markets), although Funke (2004), using a panel of 16 emerging markets, presented some evidence of a small but statistically significant stock market wealth effect from 1980 to 2000. In the same vein, Peltonen et al. (2009), building a panel for 14 emerging economies, obtained the same result for the period 1990-2008.

However, a stock market crash could also affect some people who do not directly own stock if the crash influences people's expectations or beliefs. Thus, the second transmission mechanism proposed relates to the value of the stock market response not only to fundamentals (preferences, technology and endowments, etc.), but also to beliefs or expectations (Romer, 1990; Farmer, 2011, 2013, 2015). If market participants sell stocks because they believe that future market prices will be lower, this will generate a large self-fulfilling shock to beliefs about future asset prices, in turn causing a permanent increase in the unemployment rate. When individuals' expectations worsen and they perceive high risk levels or uncertainty about the future, as happens in stock market downturns, they revise their consumption and investment decisions (even if they are not stockholders (Poterba, 2000)). Beliefs, or what are known as *animal spirits,* are given much greater weight than fundamentals. Therefore, as expectations guide consumption and investment behaviour, abrupt changes in expectations due to a stock market crash ("the Minsky moment") can lead to substantial changes in economic activity

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2   Most recent research has concentrated on analysing the influence of changes in financial and housing wealth on consumption. For the US market, some papers suggest that the housing wealth effects have generally been larger than the financial ones (Bostic et al. 2009, Carroll et al. 2011, Case et al. 2013), although Calomiris et al. (2009) argued that the housing wealth effect has been overstated and Zandi et al. (2018) found that this result may be idiosyncratic to the business cycle over which these effects are estimated. However, focusing on the Euro zone, Sousa (2009) found that financial wealth effects are relatively large and statistically significant, whereas the housing effect is not significant for the period 1980-2004.

(Romer, 1990). In any case, it is very difficult to differentiate between the wealth effect and the role of expectations; in fact, Hymans (1970) held that stock market prices affect consumption via confidence rather than through wealth.

Viewing a stock market crisis as a result of expectations about the future also has implications in terms of economic policy. In this case, policy may be designed to reduce the volatility of asset market movements. In the same vein, Caballero and Simsek (2020) constructed a model in which lower tolerance for risk due to a large negative supply shock puts downward pressure on risky asset prices, overwhelms the expected recovery effect and leads to a decline in demand that is disproportionately greater than the decline in supply. In this study, the role of the central bank is considered to be one that stimulates aggregate demand through the purchase of assets.

The third mechanism is related to the generation of financial instability. Stock market crashes could produce or exacerbate financial instability by increasing information asymmetries that have negative effects on the cost of capital (credit and financing conditions) and consequently reduce investment (Mishkin & White, 2002). On the one hand, a stock market crash affects credit markets. Firms may find it more difficult to secure financing in the market as a consequence of the losses in their net worth and the lack of good collateral for loans (adverse selection in credit markets). Moreover, the probability of loan defaults increases, given that financial intermediaries may be unable to distinguish between good and bad borrowers (moral hazard problem), and financial intermediaries or banks will increase interest rates. Higher interest rates could also have adverse effects by making it more difficult to repay loans, resulting in rising default rates. If a stock market crash is accompanied by a banking crisis (as has happened in most crises and especially in those financial systems with mixed or universal banks, which hold large portfolios), the probability of a contraction in bank loans increases. On the other hand, it may be the case that the stock market is no longer a source of financing funds for firms because their possibilities of issuing more shares decrease. Analysing 15 twentieth-century stock market crashes in the US, Mishkin and White (2002) concluded that they did not all produce financial instability, however when there is financial instability, stock market crises produce deeper depressions. As a consequence, their policy recommendation is to correct financial instability instead of the central bank taking action to prevent crashes.

In sum, stock market crashes can lead to depressions as a result of their negative impact on consumption, investment and unemployment, which could

be transmitted through the wealth effect, worsening expectations and increasing financial instability.

2. Stock market crises in Spain, 1850-2020

To identify the main stock market crises from 1850 to 2020, we have followed Barro and Ursúa (2009), who define a stock market crash as a downturn in the stock price index of more than 25% compared to the nearest historical peak. We determine the size of contractions, calculating them from the peak to the trough[3]. The data are from Madrid, Barcelona and Bilbao[4]. In Madrid, there was a stock price index (*Indice Aritmético Nominal*) from 1850 to 1936, and a total return index (*Indice General Total*) from 1940 to 2000[5], both of which have been deflated by the Consumer Price Index (Maluquer, 2013)[6]. From 2001 to 2020, the *Bolsa de Madrid* provided a total return index and we deflated this series by the Consumer Price Index from the *Instituto Nacional de Estadística* (*INE*). In Barcelona, there was a stock price index (*Índice Aritmético Nominal*) from 1850 to 1913 and a security stock market index from 1914 to 1936 (Hortalá, 2006)[7], while in Bilbao there was a stock price index (unweighted general index from Houpt & Rojo-Cagival, 2010)[8] from 1891 to 1936. These were all then deflated by CPI (Maluquer, 2013). We have opted to jointly analyse these three markets because most of the shares traded in Madrid were public securities until the First World War, whereas Barcelona and Bilbao were industrial centres for

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3   We have also applied a Hodrick-Prescott filter to gauge long-run as opposed to transitory. This method considerably reduces the number of stock market crises and does not detect some standard ones in the Spanish literature. We have decided not to use this filter in the paper.

4   The data source for Madrid and Barcelona is *Estadísticas Históricas de España* (EHE 2005) (1850-1913, 1940-2000), for Barcelona from 1913 to 1936 it is Hortalá (2006) and for Bilbao from 1891 to 1936 it is Houpt and Rojo-Cagigal (2010).

5   The index expresses the expected returns in the stock market. Then, it includes dividends, increases in capital and the reinvestment of dividends. We have excluded the years 1936-1939 because stock markets were closed during the Civil War.

6   We have updated the stock market crashes from Betrán, Martín-Aceña and Pons (2012) by using the new CPI provided by Maluquer in 2013.

7   The stock price index (1850-1913) includes bonds and stocks whereas Hortalá's index only includes stocks.

8   This index includes shares of different sectors such as banking, railways, electricity, mining, shipping and industry (see Houpt & Rojo-Cagival 2010).

consumption goods, and heavy industry, respectively, and they basically quoted private industrial and commercial securities[9]. From 1940 onwards, the index has been estimated using data from the Madrid market. As there is a break in the Madrid stock index in the period 2001-2020 with respect to the previous period 1940-2000, we have also used the stock index data from Global Financial Data (GFD) which provides a homogeneous general index for the *Bolsa de Madrid* from 1940 to 2015, to check if the stock market crises identified are the same[10]. Results are very similar in both cases[11]. The 2020 crisis is at the limit of acceptance, with a downturn in the stock price of around 24% when considering the decline from 2019 to May 2020 (which only includes five months in comparison to the average for the whole year in 2019). In any case, we do not yet know what the final macroeconomic consequences of the COVID-19 crisis will be.

According to our chosen definition, from 1850 to 2020 we have detected 16 stock market crises in Madrid, six in Barcelona, and four in Bilbao. The peaks and troughs of these crises and their declines in returns are shown in Table 1. In the three markets, bearing in mind that some crises occurred simultaneously in some of them and are counted as the same crisis, there have been a total of 18 stock market crashes, including the 2020 stock market crisis, with 17 of those occurring in the period 1850-2018. Four of the Barcelona stock market crashes coincided with crashes in the Madrid stock market, either overlapping or

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9   Castañeda and Tafunell (2001) remark that the main differences between Barcelona and Madrid are related with the different kind of firms that make up the index. The Barcelona index reflected the results of the big companies of the region. The Madrid index reflected a mixed of regional, national firms and the expectations of the foreign investors about the Spanish economy. According to Houpt and Rojo-
Cagival (2010), there is some evidence of capital market integration in the 1920s (considering the main important exchanges, Barcelona, Bilbao and Madrid) but not for the rest of the period.

10   As GFD does not provide clear details about the source of its data, we prefer to use data from EHE for the period 1850-2000 and data from *Bolsa de Madrid* from the period 2001-2020.

11   The main difference is that the 1959 crisis in this case is dated to 1961 (although the main fall comes in 1959, the index continued to drop until 1961) and the 1982 crisis is dated to 1983. For the most recent period, using the homogeneous data from GFD we identify a stock market crash in 2003, which is also captured in the *Bolsa de Madrid* data. However, in the latter case, as the data start in 2001 they do not capture the total decrease in the stock price from 2000. Consequently, the downturn is smaller than that shown by GFD. For this reason, we have used GFD to date the 2003 stock market crash. In the other cases, the dates of the stock market crises identified with the GFD data coincide with those identified from the *Bolsa de Madrid* data.

occurring in adjacent years, while two occurred only in Barcelona. In the case of the 1900-1902 Bilbao crisis, we consider the crisis as spanning the period from 1900 to 1904, coinciding with the Madrid crisis during this period (1902-1906).

Table 1: Stock Market Crises in Madrid, Barcelona and Bilbao, 1850-2020

Madrid (1850-2020)	Number	Peak	Trough	Stock returns
	1	1861	1869	-0.58
	2	1871	1874	-0.35
	3	1890	1892	-0.29
	4	1902	1906	-0.52
	5	1910	1914	-0.51
	6	1915	1922	-0.65
	7	1928	1934	-0.65
	8	1935	1940	-0.43*
	9	1947	1950	-0.62
	10	1958	1959	-0.40
	11	1973	1980[+]	-1.61
	12	1989	1992[++]	-0.31
	13	2000	2003	-0.42
	14	2007	2009	-0.56
	15	2010	2012	-0.35
	16	2017	2020[++++]	-0.24
Barcelona (1850-1936)	Number	Peak	Trough	Stock returns
	1	1852	1859	-0.66
	2	1861	1868	-1.02
	3	1881	1887	-0.70
	4	1889	1893	-0.35
	5	1916	1921	-0.51
	6	1928	1932	-0.57

Madrid (1850-2020)	Number	Peak	Trough	Stock returns
Bilbao (1891-1936)	Number	Peak	Trough	Stock returns
	1	1900	1902[+++]	-0.26
	2	1912	1914	-0.38
	3	1919	1921	-0.73
	4	1928	1932	-0.51
TOTAL	18 (we considered the1900-02 Bilbao crisis together with the 1902-06 Madrid crisis)			

Note: Data for Madrid cover the period from 1850 to 2020, for Barcelona 1850-1936, and Bilbao 1891-1936. * There are no data available; the returns are interpolated from Barro and Ursúa (2009). + it could be considered as continuing until 1982, ++ it could be considered as continuing until 1994, +++ it could be considered as continuing until 1904, as in Madrid. ++++ for 2020, the data cover the period until October 14. Total is the total number of crises in different years. We consider stock market crises that occur in overlapping or adjacent years to be the same crisis.

Sources: See text and data appendix.

As indicated in Section 2, a stock market crash may have a greater impact on economic activity when it is accompanied by a banking crisis, because it raises the likelihood of a contraction in bank loans, thus having a negative effect on investment. As shown in Betrán and Pons (2019, 2020), during the period between 1850 and 2015, there were eight stock market crises that were accompanied by a banking crisis (1866, 1882, 1892, 1914, 1921, 1931, 1976, 2008); see also Table 4. Thus, 47% of the stock market crises were accompanied by a banking crisis (8 out of a total of 17 stock market crises). Moreover, stock market crashes could also adversely affect people's expectations or beliefs and this depressive effect on expectations would be more intense in those stock market crashes that were linked to other financial crises, not only banking but also currency or debt crises. In this regard, there were 13 stock market crises that occurred simultaneously with another type of crisis (76% of total stock market crises were multiple crises). In fact, there were six triple crises (banking, currency and stock market), and three of these also involved a debt crisis. Thus, it is likely that these stock market crashes that formed part of a multiple crisis would have had an even more profound negative impact on expectations, and consequently on economic activity, than a stock market crisis alone.

Given the different sources of stock market crises' economic impact, in the next section we analyse the relationship between stock market crashes and major economic contractions or depressions.

3. Stock market crises and macroeconomic depressions, 1850-2018

In this section, we match the stock market crises with economic depressions from 1850 to 2018. We calculate contractions by computing peak-to-trough fractional declines that exceed a threshold amount; specifically, we set the limit at 0.10, as in Barro and Ursúa (2008, 2009, 2017). The real GDP per capita values used are from the last update by Prados de la Escosura (2017). These declines in real per capita GDP can apply to multiple years[12]. We have seven macroeconomic contractions or depressions in Spain: 1866-1868, 1877-79[13], 1894-1896 (we also can consider the period as covering 1892-96, in line with Barro and Ursúa (2008, 2009, 2017) for Spain), 1909-14 (although not all years registered a continuous decline in real GDP per capita, it can be labelled a depression if we consider the cumulative contraction), 1929-33, 1935-1938 (which coincides with the Spanish Civil War that lasted from 1936 to 1939) and 2007-2013. Finally, 1901-05 was close to being a macroeconomic contraction (-0.094). In the US, there were only two macroeconomic contractions in the period from 1869 to 2008: one was the 1917-21 contraction (due to the effect of the influenza pandemic) and the other was 1929-33 (Barro & Ursúa, 2017). Therefore, in comparison, Spain has had numerous economic depressions during the period considered.

In Table 2 we present the matches between stock market crashes and depressions. The table is divided into three panels: 1) stock market crises with depressions, 2) depressions without stock market crises and 3) stock market crises without depressions. In the period 1850-2018 we have documented five stock market crises with depressions[14], two depressions without a stock market crisis

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12   Sometimes there are intermediate years with small increases in real GDP per capita. The results presented only consider the declines, but results are robust to alternative specifications. for example, if multiyear contractions are excluded or broken into two separate events. There are small differences in the 1892-96 crisis (instead of a depression of -0.159, if considering declines and increases it would be -0.147) and 1929 (-0.119 instead of -0.137). The only significant difference would be 1909-14, which would not be considered a depression if considering increases and declines.

13   However, the period 1877-79 was close to being a macroeconomic contraction using the previous GDP data from Prados de la Escosura (2003).

14   Although we have considered the 2007-2009 and the 2010-2012 stock crises separately in the total number of crises, as the macroeconomic depression happened from 2007 to 2013, we consider the two stock market crises together in the match between stock market crashes and depressions.

and nine stock market crises without depressions; however, in the last group the 1871-74 and 1902-1906 stock market crises were close to being a depression. If, for comparative purposes, we only consider the period 1850-2006—that is, the period analysed in Barro and Ursúa's (2017) study—the results are as follows: four stock market crises with depressions, two depressions without stock market crises and nine stock market crises without depressions. In the case of the US, there were no depressions there were not associated with a stock market crisis, whereas in the case of Spain there were two depressions not associated with a stock market crisis: 1877-79 and 1892-96[15].

Table 2: Depressions with and without Stock Market Crises, 1850-2018

Panel A: Stock Market Crises and Depressions. Number: 5				
Stock Market period	Stock prices or returns	GDP period	GDP contraction	Comments
1861-69	-0.58	1866-68	-0.141	Included in the total
1910-14	-0.51	1909-14	-0.123	Not in Barcelona
1928-34	-0.65	1929-33	-0.137	Included in the total
1935-40*	-0.43	1935-38**	-0.328	Included in the total
2007-09 2009-12	-0.56 -0.35	2007-13	-0.109	Included in the total
Panel B: Depressions without Stock Market Crises. Number: 2				
Stock Market period	Stock prices or returns	GDP period	GDP contraction	Comments
		1877-79	-0.113	
		1892-96	-0.159	Included in the total
Panel C: Stock Market Crises without Depressions. Number: 9				
Stock Market period	Stock prices or returns	GDP period	GDP contraction	Comments
1852-59	-0.699	1855-57	-0.080	Only in Barcelona

15   In these two periods, the stock market crisis does not coincide with a depression, but the depression happened in the years after (the 1877-79 contraction after the 1871-74 stock market crisis) or even immediately after a stock market crisis (the 1892-96 depression happened after the 1890-92 stock market crisis).

Panel C: Stock Market Crises without Depressions. Number: 9				
Stock Market period	Stock prices or returns	GDP period	GDP contraction	Comments
1871-74	-0.36	1873-74	-0.087	Close to being a contraction
1881-87	-0.70	1884-87	-0.082	Only in Barcelona
1902-06	-0.63	1901-05	-0.093	Not in Barcelona Close to being a contraction
1915-22	-0.65	1916-18	-0.032	
1947-50	-0.62	1947-49	-0.022	No data for Barcelona and Bilbao
1956-60	-0.35	1958-60	-0.027	No data for Barcelona and Bilbao
1974-80	-1.44	1980-81	-0.008	No data for Barcelona and Bilbao
1989-92	-0.33	1992-93	-0.021	No data for Barcelona and Bilbao

Note: Stock market crises are cumulative multiyear returns of -0.250 or less. GDP contraction is cumulative multiyear declines of at least 0.10. GDP is real GDP per capita. We present the GDP reduction when the GDP period coincides with a peak-to-trough period in adjacent years. * There are no data; the returns are interpolated, from Barro and Ursúa (2009), calculated over the period that bridged the gap in the annual data.**Coincides with the Spanish Civil War (1936-39).

Sources: see text.

In the aforementioned study carried out by Barro and Ursúa (2017) that considered 30 countries (20 OECD) for the period 1869-2006, there were 71 cases of stock market crises matched with macroeconomic declines (stock market crashes that paired up with depressions), 29 cases of depressions that were not associated with stock market crises and 161 cases of stock market crises not associated with depressions. That equates to an average per country of 2.36 stock market crises with depressions, 0.96 depressions without stock market crises and 5.36 stock market crises without depressions. In the period 1850-2006, Spain is above the average in terms of stock market crises with depressions (4) and especially so in terms of stock market crises without depressions (9), whereas it is below average in terms of depressions without stock market crises (2)[16].

In Table 3 we calculate the frequency of stock market crashes and depressions for Spain, which we can compare with the corresponding figures for the US and 30 other countries (20 OECD) measured in Barro and Ursúa

16   If we consider the longer period 1850-2018, there are five stock market crises with depressions, and the rest remain unaltered.

(2017). In Spain for the period 1850-2006 (the same as in Barro and Ursúa's research), if one knows that a stock market crash (cumulative returns of -0.250 or worse) occurred, the probability that a depression (over the threshold of 0.10 or more) also occurred is 26.6 % (4 out of 15 stock market crashes). Furthermore, if one knows that a depression (0.10 or more) occurred, the probability that a stock market crash (-0.250 or worse) also occurred is 66.6 % (4 out of 6 depressions).

Table 3: Frequency of Stock Market Crashes and Depressions
in comparison with other countries, 1850-2006/18

Number of events			
Total non-war and war period	Stock Market Crashes	Depressions	Both
Spain (1850-2006)	15	6	4
Spain (1850-2018)	17	7	5
US (1869-2006)	7	2	2
30 countries (1869-2006)	232	100	71
Average per country	7.7	3.3	2.36
20 OECD countries (1869-2006)	148	57	41
Average per country	7.4	2.85	2. 05
Non-war period			
Spain (1850-2006)	14	5	3
Spain (1850-2018)	16	6	4
30 countries (1869-2006)	192	63	42
Average per country	6.4	2.1	1.4
20 OECD countries	118	29	20
Average per country	5.9	1.45	1.0
War period*			
Spain (1850-2006)	1	1	1
Spain (1850-2018)	1	1	1
30 countries (1869-2006)	40	37	29
Average per country	1.33	1.23	0.96
20 OECD countries	30	28	21
Average per country	1.5	1.4	1.05

Note: * War period is limited to active hostilities.

Source: For Spain, see text. For 30 countries and 20 OECD countries, see Barro and Ursúa (2017).

In all 30 countries contained within the Barro and Ursúa (2017) sample, if one knows that a stock market crash (return of -0.250 or worse) occurred, the probability that a depression (0.10 or more) also occurred is 30.6%; in the case of the 20 developed countries, the probability is 27.7%; and in the case of the US, it is 28.6%. However, if one knows that a depression (0.10 or more) occurred, the probability that a stock market crash (-0.250 or worse) also occurred is 71%, with a very similar probability for the 20 OECD countries (71.9%) but 100% probability for the US, as commented above. Therefore, the probability is lower in Spain (26.6%) of a stock market crash being paired with a depression than in the average of 30 countries, 20 developed countries and the US. There is also a lower probability of a depression coinciding with a stock market crash (66.6%) relative to the 30-country and 20-country samples and the US. However, when considering the longer period 1850-2018, if one knows that a stock market crash occurred, the probability that a depression also occurred rises to 29.4%, which is much more similar to the samples of 30 countries (30.6%) and 20 developed countries (27.7%) and the US (28.6%); and if one knows that a depression occurred, the probability that a stock market crash also occurred rises to 71.4%, which is very similar to the sample of 30 and 20 countries and only lower than in the US (where the probability is 100%)[17].

Given that Barro and Ursúa (2009, 2017) found a higher probability in wartime of a stock market crash being associated with a depression, we distinguish between non-war and war periods in Table 3. In the non-war period in the sample of 30 countries, when a stock market crash occurs, the probability of a depression is 21.8% instead of 30.6%, and in the 20 countries (OECD) it is 16.9% instead of 27.7%. In the case of Spain, when a stock market crash occurs, the probability of a depression is 21.4%, similar to the sample of 30 countries (21.8%) and higher than the probability for the sample of 20 countries (16.9%). However, in the wartime period, for all 30 countries, if a stock market crash happens the probability of a depression is 72.4%, with a similar value for the 20 OECD countries (70%). Conversely, the probability is 100% in the Spanish case.

17   Note that in Barro and Ursúa (2009, 2017) the last year of the sample is 2006. We do not have data from the Barro and Ursúa sample for the longer period (1850-2018). However, considering what happened in the 2008 and 2020 crises, we could assume that our results would hold for the longer period and that the probability of a depression occurring when there is a stock market crisis will be similar in Spain and in the 30- and 20-country samples.

Finally, considering only non-war times, we analyse whether stock market crises with and without depressions were accompanied by other types of crises. As seen in Table 4, all the stock market crises with depressions also came with banking crises (three of them were also accompanied by a currency and/or a debt crisis). Therefore, the conditional probability of a depression occurring if there was a stock market crash during non-war times in the context of a banking crisis is 100% (4 out of 4). There were only three stock market and banking crises without a depression: 1881-87, 1915-22 (although Spain was neutral during the First World War, the financial sector was affected) and 1974-80, and in two of these crises the GDP contraction was relatively severe (8.2% in the 1881-87 stock market crash and 8% in the 1974-80 crash).

Table 4: Depressions with and without Stock-Market Crises and
other types of crises in non-war period, 1850-2018

Panel A: Stock Market Crises with Depressions		
Stock Market crashes	with other type of crises	GDP contraction
1861-69	B+D	1866-68
1910-14	B	1909-14
1928-34	C+B	1929-33
2007-09 2009-12	C+B+D	2007-13
Panel B: Stock Market Crises without Depressions		
Stock Market crashes	with other type of crises	
1852-59	D	
1871-74	D	
1881-87	C+B+D	
1902-06		
1915-22	B	
1947-50	C	
1956-60	C+D	
1974-80	C+B+D	
1989-92	C	

Note: B: banking crisis, C: currency crisis, D: debt crisis. For the definition
of these types of crises, see Betrán and Pons (2020)

Sources: see text.

In short, Spain suffered more stock market crises than the samples for other countries (the US, 30 countries and the 20 OECD countries), but these crises had a lesser economic impact than in the countries considered in the comparison. The high frequency of stock market crises by international standards, especially in the period 1850-1913 and the post Bretton Woods era, is linked to capital globalization. In the period 1850-1913, capital globalization facilitated the inflow of foreign capital into some specific sectors such as railways and mining, which fuelled the creation of bubbles and encouraged speculation. In fact, with the exception of the 1905 crisis, all the stock market crises of the period 1850-1913 were linked to the construction of the railways and the creation of a bubble in this sector. In this period, capital globalization also enabled the government to borrow from abroad. As a result, there was a substantial increase in the Spanish public debt-to-GDP ratio as well as several defaults and debt restructurings. This growing public debt impacted the stock market due to the fact that public debt represented a majority of the securities exchanged in the Spanish stock market. Although this feature is also characteristic of the development of early stock exchanges in other countries, the Spanish stock exchange was closely linked to the financial needs of the State as a result of a very backward fiscal structure and persistent large public deficits. Moreover, these deficits worsened due to the country's military efforts, in particular the war with Cuba, and this negative effect was clear in the 1874 and 1882 stock market crises. In fact, Cuevas (2013) affirms that until 1935 there is a clear correlation between the evolution of the stock market index, the public budget deficits and the increase in public debt.

Capital globalization also affected Spain after its entry into the European Union and later into the European Monetary Union, when it received large entries of foreign capital that boosted the growth in credit and the debt of households and non-financial corporations, as well as fuelling the housing bubble that finally burst in 2008. Financial liberalization in the period 1850-1913 and the post Bretton Woods era also facilitated credit growth and the creation of bubbles (in railways, mining and construction). Finally, international contagion can also explain the high frequency of Spanish stock market crises. For example, in the period 1850-1913, we observe that out of the six stock market crises recorded in Spain, four match the international financial crises of 1866, 1874, 1882 and 1892. In the interwar period, the probability of contagion was even higher since the three Spanish stock market crises—1914, 1921 and 1931—coincided with the international crises that plagued the world economy around the same time.

One possible explanation of the lesser economic impact of stock market crises in Spain by international standards could be that the stock market was not an important source of financing for most firms. Furthermore, the financial market was not very well developed for most of the period. As mentioned, the expansion of the Spanish stock market during the second half of the nineteenth century was linked to the public debt issues. However, the size of the stock market (measured by the ratio of stocks traded to GDP) began to shrink in the first decades of the twentieth century, when the issue of new securities in the financial and industrial sectors failed to offset the progressive decline in public debt issues (Cuevas, 2013). The stock market became more dynamic during the 1920s, but the Civil War and the Franco dictatorship produced a sluggishness in the stock market. Not until the economic growth of the 1960s did Spain see an increase in the trading volume of investment flows channelled through the stock exchange. Despite this, Sardà (1967) indicated that in 1964 the stock market in Spain was more similar to those of underdeveloped countries in terms of size and also performance (low levels of transactions, participants, etc.). It was only in the 1980s and mainly from the early 1990s onwards that the Spanish stock market achieved the size and performance of other developed countries' markets[18]. Therefore, the stock market crashes have had less of an impact on the rest of the economy than in other more financialized economies.

Notwithstanding, all the crises that coincided with a depression were banking or multiple crises associated with banking crises. Banking crises disrupt the flow of bank credit to firms; if this coincides with a stock market crisis, it prevents the stock markets from acting as an alternative source of finance. Consequently, the simultaneous banking and stock market crises had a harmful effect on investment, employment and economic activity. In the Spanish case, the major impact of banking and stock market crashes could also be related to the fact that banks held large industrial portfolios and were heavily involved in financing the public deficit, with substantial amounts of public debt on their books (Comín & Cuevas, 2017). As a consequence, there was a feedback loop between banking and stock market problems, generating a major macroeconomic impact.

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18   Cuñado-Eizigarri, Gomez-Biscarri and Pérez de Gracia (2004) consider 1990 as a year marking a "before and after" in the history of the Spanish stock market. The 1988 Stock Market Law (1988) and the Maastricht Treaty favoured the development and consolidation of the Spanish stock market after the 1990s.

Betrán and Pons (2019, 2020) studied the importance of external debt booms or capital flow bonanzas producing financial instability and a higher frequency and severity of crises. In these studies, crisis severity is calculated as the difference between the pre-crisis trend of output growth and observed GPD growth until when annual output growth returns to its pre-crisis trend (for the calculation, see also Betrán et al., 2012). In this paper, instead of considering output loss, we analyse the declines in GDP that can be considered a macroeconomic contraction or depression (measured as cumulative contractions in real GDP per capita by computing peak-to-trough declines that exceed the limit of 0.10). It seems that the contraction was greater, in terms of a deeper real GDP per capita decline (a macroeconomic contraction or depression), when stock market crises were accompanied with another source of financial instability, especially banking crises. As a result, it appears that the main channel through which the effect of stock market crises can profoundly affect the economy is financial instability. Recessions are worse when a stock market crash occurs along with another source of financial instability, such as a banking crisis.

4. Conclusions and the main potential driver of stock market crises and depressions in Spain

As Barro and Ursúa (2017) indicate, stock market crashes have substantial predictive power for depressions. Our results show that the frequency of stock market crises is higher in Spain than in the US, the 30 countries and the 20 developed countries included in Barro and Ursúa's research. However, in relative terms the macroeconomic impact of these stock market crashes was lower when considering the period 1850-2006 (although not markedly different from the result for the 20 countries). One possible reason for this result could be the smaller size and lower level of development of the stock market in Spain throughout most of the period. When considering the most recent crises, and consequently a longer period – 1850-2018 – if one knows that a stock market crash occurred, the probability that a depression also occurred is higher in Spain than in the 20 OECD countries and the US, and only lower than in the 30-country sample (which includes developed and developing countries). It seems that the link between stock market crashes and depressions is higher in more developed stock markets. Therefore, given the frequency of stock market crashes in Spain, the development of its stock market and its integration in the world economy has

increased the vulnerability of the country by raising the probability of a depression also occurring.

Taking into account the abovementioned transmission channels through which a stock market crash could have a negative impact on economic activity, the two most feasible mechanisms in the Spanish case seem to be increasing financial instability and creating negative expectations. We analyse the conditional probability of a depression given a stock market crash occurring during non-war times in the context of a banking, currency or debt crisis. Our results show that all four stock market crashes accompanied by depressions were also banking crises. The link between banking and stock market crises could be related to the fact that Spanish crises are more frequent and deeper when external credit booms occurred (Betrán & Pons, 2019). Thus, periods with capital flow bonanzas, and a liberal financial framework, fuel asset booms and drive up private and public borrowing, which in turn paves the way for stock market crises (Betrán & Pons, 2020). The severity of multiple crises due to capital bonanzas operates through the financial instability channel produced by a sudden stop, which generated a credit crunch. In turn, this increases the cost of capital and, consequently, the probability of a depression also occurring.

To sum up, our results show that if a stock market crash occurs in Spain, the probability of a depression also occurring was 26.6% for the period 1850-2006, which is lower than the corresponding average for the analysed countries. This probability rises to 29.4% when the time period is extended to 1850-2018, which is much closer to the aforementioned average. Correspondingly, in the case of a depression coinciding with a stock market crash, this percentage rises from 66.6% to 71.4% in the two periods considered. Following the development and international integration of Spain's financial system, the Spanish case has become more similar to those of other developed countries and stock market crashes seem to be more predictive of the prospects of a depression, especially when the stock market crash is accompanied by a banking crisis.

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