How Do Insolvency Codes Affect a Firm's Investment?

Julio Pindado[a*], Luis Rodrigues[b], Chabela de la Torre[a]

[a]Universidad de Salamanca, Spain
[b]Instituto Superior Politecnico de Viseu, Portugal

Abstract

This paper provides an ex ante analysis of the effect of financial insolvency codes on investment by examining the main characteristics embodied in several codes that may cause investment distortions. The results from the estimation of an extended version of the q model of investment show a negative relationship between ex ante insolvency costs and investment. Furthermore, most of the analysed characteristics of insolvency codes negatively impact on investment; however, the magnitude of this effect is greater concerning those of reorganization without creditors' consent and creditors' lack of control, as compared to those of automatic stay and the violation of absolute priority.

Key words: insolvency codes, investment, insolvency costs

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[*] Corresponding author. Dpt. Administracion y Economia de la Empresa, Campus Miguel de Unamuno. E37007 Salamanca, Spain. E-mail: pindado@usal.es. We thank Susana Alonso, Maria Brouwer, Anthony Bowrin, Francesca Cornelli, Susanne Espenlaub, Francisco Gonzalez, David Hilier, Kevin Keasy, Maria Marchita, Artur Morgado, Aydin Ozkan and an anonymous referee for helpful comments. We are particularly grateful for the helpful comments and suggestions made by Julian Franks, proffered in several meetings held while the paper was still in its fomative stages. We have also benefited from comments of seminar participants at the 2003 ISINI Conference, 2003 ACEDE Conference, 2003 AEFIN Conference, 2005 Leeds University Business School, 2005 Manchester Business School and 2005 University of York (Dpt. Economics). Pindado and de la Torre also thank the research agency of the Spanish Government, DGI (Project BEC2001-1851) and the Junta de Castilla y Leon (Project SA 033/02) for financial support. Rodrigues is also grateful for the financial support received from the European Union (PRODEP Program – Measure 5, Action 5.3) and ESTV. This paper began when Pindado was a visiting fellow at the Institute of Finance and Accounting of the London Business School; he acknowledges the facilities and hospitality received. We are solely responsible for any possible remaining errors.

1. Introduction

Financial insolvency is not costless in practice, since it generally involves losses in value of the firm's assets (Jensen and Meckling, 1976), hence insolvency codes should be written in order to minimize the deadweight distress costs. White (1996b) classifies financial distress costs according to the point in time at which they arise. That is: i) before knowing whether the firm will be financially distressed or not; ii) after the firm's becoming financially distressed; iii) after the bankruptcy filing. All firms face the first kind of costs, called ex ante costs of financial insolvency. However, only some companies become financially distressed, and only a small percentage of them file for bankruptcy. In fact, as pointed out by White (1996b), ex ante costs are the most important source of bankruptcy costs, since they apply to all firms in general. Therefore, financial insolvency codes could be more concerned with setting up incentives for firms in order to mitigate ex ante financial distress costs, rather than with providing help for companies in financial distress or bankruptcy. In this sense, financial insolvency codes should establish an ex post distribution of the firm's assets encouraging economic agents to take the most efficient ex ante decisions, since, as Berkovitch et al. (1997) argue, the distribution of the firm's ex post value plays an important role in establishing ex ante incentives. In the same line, Bigus (2002) points out that besides maximizing the ex post value of the firm after filing for bankruptcy, another basic goal of the insolvency law should be to provide ex ante incentives in order to avoid such a situation.

The approach of our paper is thus to study how financial insolvency codes affect the allocation of financial resources to their most suitable uses (investments). As Schwartz (1997) and Povel (1999) point out, bankruptcy laws may introduce distortions in a firm's investment; hence our aim is to analyse how insolvency codes affect a firm's investment decision, or more precisely, to investigate which characteristics of several codes make a significant contribution to the observed inefficiencies.

Note that, as in Povel (1999), our study follows the ex ante approach[1] by analysing how firms make their investment decisions, and it thus differs from the ex post analysis provided by Gertner and Scharfstein (1991)[2]. The ex ante approach can also be found in Bigus (2002), who focuses on the ex ante efficiency of the insolvency law when motivating managers to choose efficient investment policies. However, Bigus (2002) constrains his analysis to the role played by the insolvency law in mitigating the conflicts of interest among senior and junior creditors, whereas we expand on this analysis by concentrating on all the conflicts among the main stakeholders that give rise to ex ante insolvency costs and, consequently, to investment distortions. Finally, the results in Davydenko and Franks (2005) also support our approach in two important ways. First, their evidence concludes that insolvency codes matter and, consequently, it make sense to analyse how they matter for the investment decision. Second, they find strong evidence that banks react ex ante to the expected ex post deficiencies of insolvency codes, and an ex ante analysis is thus needed to assess the economic efficiency of the laws.

To achieve our aim, we develop an investment model that allows us to study how financial insolvency costs affect investment across countries, and how different characteristics embodied in the codes influence the sensitivity of investment to cash flow. To learn which characteristics of these codes are more likely to cause distortions in a firm's

[1] This ex ante analysis is consistent with White (1996b), who claims that ex ante costs of financial insolvency are the most relevant costs.

[2] Blazy and Chopard (2004) provide a first step in the design of an economically efficient code dealing with both ex ante and ex post efficiencies.

investment, we have examined the financial insolvency codes of five well-developed countries (the United States, the United Kingdom, Germany, France and Spain).

Our results indicate that there is a negative relationship between the investment level and ex ante financial insolvency costs; in other words, these costs lead firms to forego investment projects. We also find that the differences in the ex ante insolvency costs across countries explain to some extent the effect of the institutional context on a firm's investment. In fact, we find that insolvency codes play a crucial role in determining the sensitivity of investment to fluctuations in cash flow and, consequently, that adequate insolvency laws may encourage firms to make efficient investment decisions. Specifically, all the characteristics of the analyzed insolvency codes that are expected to give rise to underinvestment processes are found to increase the sensitivity of a firm's investment to its cash-flow. However, the negative consequences for investment efficiency of the possibility of reorganization without creditors' consent and of creditors' lack of control when the firm files for reorganization are greater than those of the imposition of the automatic stay on secured creditors and the violation of the absolute priority rule.

The remainder of the paper is organised as follows. In Section 2, we develop the specification of the models and pose the hypotheses of our empirical study. Section 3 describes the data set and the estimation method. In Section 4, we discuss the relation between investment and ex ante insolvency costs, and how each characteristic of an insolvency code affects a firm's investment. Finally, Section 6 concludes.

2. Specification of the model and hypotheses

We use the well-known q model of investment in order to investigate how financial insolvency codes affect investment. This is a common empirical specification that emphasizes market valuation of the firm's assets as a determinant of investment. Following Fazzari et al. (1988), we propose the following general specification of the investment equation:

$$\left(\frac{I}{K}\right)_{it} = f\left(\frac{CF}{K}\right)_{i,t-1} + g(X)_{i,t-1} + \nu_{it} \tag{1}$$

where *f* is a function that depends on cash flow, and it thus represents the potential sensitivity of investment to fluctuations in cash flow after controlling for the variables in function *g*. Consistent with the pecking order and the free cash flow theories, a positive relationship between investment and cash flow is expected. Function *g* depends on vector X, which includes other variables explaining a firm's investment according to financial theory. Within the q-theory framework, our basic specification controls for investment opportunities by including Tobin's q in vector X, which also contains a lag of the dependent variable in order to make the model dynamic. Hence, after substituting Tobin's q and a lag of investment for vector X, our basic specification is as follows:

$$\left(\frac{I}{K}\right)_{it} = \beta_1\left(\frac{CF}{K}\right)_{i,t-1} + \beta_2 q_{i,t-1} + \beta_3\left(\frac{I}{K}\right)_{i,t-1} + \nu_{it} \tag{2}$$

where I_{it} denotes investment, CF_{it} is cash flow, q_{it} represents Tobin's q, K_{it} is the replacement cost of capital, and ν_{it} is an error term[3].

Since we are interested in learning how financial insolvency costs affect investment, the basic specification in (2) has to be extended by incorporating another variable into function *g*: ex ante financial insolvency costs, $EAIC_{i,t-1}$. This variable has two components. The first one, $PI_{i,t-1}$, is a firm's probability of insolvency, i.e., the probability of a firm becoming financially distressed. This probability is measured following the procedure described in the Appendix.

[3] The subscript i refers to the individual cross-sectional unit, in this case firms, and t refers to the time period, in this paper a business year.

The second component, $EPIC_{i,t-1}$, captures the ex post insolvency costs borne by the firm when it files for bankruptcy, i.e., the value loss of the firm's assets in case of bankruptcy. The value of intangible assets is especially affected when the firm files for bankruptcy and, consequently, these assets capture great part of the loss the firm would suffer in case it filed for bankruptcy. Hence we use a firm's intangible assets including goodwill as a good proxy for the ex post insolvency costs it bears, which is thus a firm-specific variable. Ex ante financial insolvency costs are firm-specific as well, since they are measured as the product of these two firm-specific items, i.e., $EAIC_{i,t-1}=PI_{i,t-1}EPIC_{i,t-1}$. Therefore, the $EAIC_{i,t-1}$ variable denotes the expected insolvency costs, according to the probability of insolvency and the ex post financial insolvency costs. Since the value of the probability of insolvency always ranges from 0 to 1, the $EAIC_{i,t-1}$ variable takes the highest values when $PI_{i,t-1}$ and $EPIC_{i,t-1}$ are high, and the lowest values when $PI_{i,t-1}$ is near zero and $EPIC_{i,t-1}$ is low.

Consequently, our extended model including the ex ante insolvency costs variable is:

$$\left(\frac{I}{K}\right)_{it} = \beta_1\left(\frac{CF}{K}\right)_{i,t-1} + \beta_2 q_{i,t-1} + \beta_3\left(\frac{I}{K}\right)_{i,t-1} + \beta_4 EAIC_{i,t-1} + v_{it} \tag{3}$$

This model allows us to pose our first hypothesis regarding the relationship between investment and ex ante financial insolvency costs:

Hypothesis 1. *A firm's investment is inversely related to the ex ante financial insolvency costs it faces.*

Assuming this first hypothesis holds, our second concern is to study the effect of institutional differences across countries on the investment decision, and whether or not part of such an effect is a consequence of the differences in ex ante insolvency costs borne by firms. We thus investigate several countries with different codes, which leads us to pose a new hypothesis:

Hypothesis 2. *A firm's investment includes a country-specific effect, which is less significant when ex ante insolvency costs are controlled for in the investment model*.

To test this second hypothesis, several country dummy variables are entered into our model as follows:

$$\left(\frac{I}{K}\right)_{it} = f\left(\frac{CF}{K}\right)_{i,t-1} + g(X)_{i,t-1} + c_i + \nu_{it} \tag{4}$$

where c_i are dummy variables that take value 1 if firm i belongs to a specific country, and 0 otherwise. These dummy variables control whether a firm's investment has a specific component for each country. A Wald test is then used to check this effect, and whether this effect decreases when ex ante financial insolvency costs are controlled for, which would mean that the ex ante insolvency costs faced by firms is a variable specific to each country.

Relying on the previous two hypotheses, our strategy consists of studying how the main characteristics of financial insolvency codes affect investment. Consequently, we focus on five well-known financial insolvency codes around the world[4] (i.e., the United States, the United Kingdom, Germany, France, and Spain) in order to provide empirical evidence on how each characteristic affects a firm's investment. The relevant literature on financial insolvency codes (see Panel A of Table 1) highlights two kinds of characteristics. On the one hand, several characteristics, such as violations of the absolute priority rule, automatic stay, reorganization without creditors' consent, and creditors' lack of control of the reorganization process, facilitate underinvestment processes. On the other hand, the last characteristic to be considered encourages overinvestment processes, as occurs in codes allowing management to stay in cases of financial insolvency (i.e., lenient codes). Based on this relevant literature, Panel B of Table 1 characterizes the insolvency codes of the five countries in our study according to the above-mentioned legal features and their impact on the investment decision.

4 It is worth noting that these countries can be considered as a representative sample for the different legal systems.

<Insert Table 1 about here>

The first characteristic is the absolute priority rule that favours secured creditors in the distribution of the proceeds. The French and Spanish insolvency codes violate the absolute priority of secured creditors (bondholders), ranking other non-secured creditors (such as the government and workers) first in the distribution of proceeds (see Ramos, 1993; Kaiser, 1996). The US code is also characterized by the violation of absolute priority but, in this case, favouring shareholders (see Weiss, 1990; Franks and Torous, 1994). Another well-known characteristic in financial literature is the automatic stay. Some insolvency codes (e.g. US and French codes) impose an automatic stay that stops all principal and interest payments, and prevents secured creditors from taking possession of their collateral. In some countries (e.g. France and Spain), financial insolvency codes permit management to seek protection from creditors by filing for reorganization without their consent. This lack of restrictions when filing for reorganization allows management to delay payments (money or collateral) to bondholders, which may have two outcomes. First, the bargaining power of bondholders may be reduced. Second, available funds to pay bondholders may decrease as a result of the disappearance or loss of collateral value. In addition, financial insolvency codes do not usually give control to creditors when the firm files for reorganization. For example, in France, Spain, the US and Germany, creditors are unable to make decisions about the future of the company, since the debtor remains in control (see Franks and Torous, 1989; Ramos, 1993; Franks et al., 1996; Kaiser, 1996; and White, 1996b). The four characteristics mentioned above increase the risk born by bondholders, who would require a higher premium (or even refuse to lend new money), thus increasing the likelihood of underinvestment. The last characteristic refers to how the insolvency code treats managers. In this context, we classify as lenient those codes allowing management to stay in case of financial insolvency (US, French, German and Spanish codes), and as harsh codes those where management does not stay (UK code)[5]. Therefore, harsh codes increase managers' risk, thus preventing them from undertaking negative NPV projects and, consequently, firms under lenient codes are more prone to overinvest.

Consistent with the different effect expected for each of the described characteristics on investment, we propose our last hypothesis:

Hypothesis 3. *Some characteristics of an insolvency code have a significant impact on investment.*

The econometric specification that allows us to test this hypothesis is:

$$\left(\frac{I}{K}\right)_{it} = (\beta_1 + \gamma_1 DC_i)\left(\frac{CF}{K}\right)_{i,t-1} + g(X)_{i,t-1} + c_i + \nu_{it} \qquad (5)$$

where DC_i is a dummy variable that takes a value of 1 when the firm belongs to a country whose insolvency code complies with a certain characteristic, and 0 otherwise. For instance, to study the effect of the violation of absolute priority, the dummy variable would take 1 when the firm belongs to a country whose insolvency code violates the absolute priority rule, and 0 otherwise. This strategy allows us to study the impact of the violation of the absolute priority rule on investment. Specifically, the investment-cash flow sensitivity of firms belonging to a country whose insolvency code does not violate the absolute priority rule is β_1, since DC_i is equal to 0; and the investment-cash flow sensitivity of firms belonging to a country whose insolvency code violates the absolute priority rule, for which DC_i is equal to 1, is $(\beta_1+\gamma_1)$. To check whether or not the $(\beta_1+\gamma_1)$ coefficient is significantly different from zero, we perform the linear restriction test whose null hypothesis is $H_0:\beta_1+\gamma_1=0$.

[5] La Porta et al. (1998) provide a dummy variable that takes value 1 if management does not stay, and 0 otherwise.

3. Database and estimation method

3.1. Data

Given the scope of our study, data from several well-developed countries were needed. We thus used an international database, Compustat Global Vantage, as our principal source of information. Additionally, international data such as the growth of capital goods prices, the rate of interest of short term debt, and the rate of interest of long term debt, were extracted from the Main Economic Indicators published by the Organization for Economic Cooperation and Development (OECD).

Since our study is intended to present a wide variety of institutional environments of well-developed countries, we selected five strongly representative countries in the world economy: the United States, the United Kingdom, Germany, France and Spain. For each country, we constructed an unbalanced panel comprising companies for which the information was available for at least six consecutive years between 1990 and 1999[6]. In fact, having five periods is a necessary condition in order to test for second-order serial correlation (Arellano and Bond, 1991) and, since we lost one one-year data in the construction of some variables (see appendix), six consecutive periods were needed[7].

For each of the five selected countries, we collected data from all available non-financial companies that maintained their activity throughout the sample period. This information is

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[6] Our panel covers just until 1999 since in that year the current bankruptcy code in Germany became effective, introducing important differences as compared to the old code (see Davydenko and Franks, 2005).

[7] Unfortunately, only a small number of observation periods is available in Compustat Global Vantage for Spain. To solve this problem we used an alternative database from the CNMV (Spanish Security Exchange Commission). This database allowed us to extract a large enough panel for Spanish companies, but it does not contain the market value of the company shares. For this reason, data on the market value of the company shares were extracted from the Daily Bulletin of the MSE (Madrid Stock Exchange).

available in the *Global Vantage Industrial Active* file. To avoid the survival bias, our panel also includes companies from the *Global Vantage Industrial Research* file, which provides data on companies which were suspended from quotation for some reason (e.g. bankruptcy and liquidation) after a certain period in the capital market[8]. The structure of the panel by number of companies and number of annual observations per country is given in Table 2.

<Insert Table 2 about here>

As shown in Table 3, all companies in our sample were allocated to one of eight broad economic industry groups in accordance with the Economic Sector Codes (SIC) reported in Compustat Global Vantage. Financial services (code 5000) were excluded, since such companies have their own specificity in financial insolvency. Finally, Table 4 reports summary statistics (mean, standard deviation, maximum and minimum) of the variables used in the estimations.

<Insert Tables 3 and 4 about here>

3.2. Estimation method

All models specified in Section 3 have been estimated by using the panel data methodology. Unlike cross-sectional analysis, panel data allow us to control for individual heterogeneity, and to eliminate the risk of obtaining biased results because of such heterogeneity (Moulton, 1986, 1987). Specifically, we have controlled for heterogeneity by modelling it as an individual effect, η_i, which is then eliminated by taking first differences of the variables. As shown in the following general specification, the error term of our models has several components:

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[8] The Spanish dataset was built by incorporating companies on a yearly basis. Therefore, if a company is suspended from quotation in a certain period, it remains for the previous periods, thus avoiding the survival bias.

$$\left(\frac{I}{K}\right)_{it} = f\left(\frac{CF}{K}\right)_{i,t-1} + g(X)_{i,t-1} + \eta_i + d_t + c_i + \tau_{it} \tag{6}$$

where d_t measures the time-specific effect with the corresponding dummy variables, so that we can control for the effect of macroeconomic variables on a firm's investment; c_i stands for the country-specific effect measured by dummy variables, which are only entered into models including several countries; and τ_{it} is the random disturbance.

All our models have been estimated by using the generalized method of moments (GMM), which allows us to control for endogeneity problems by using instruments. We have used all the right-hand side variables in the models lagged twice or more as instruments in order to improve efficiency. This strategy, suggested by Arellano and Bond (1991), consists of obtaining additional instruments using the orthogonality conditions that exist between lagged values of the right-hand side variables.

The estimation is carried out using DPD98 for GAUSS written by Arellano and Bond (1998). To check the potential misspecification of the models we use the Sargan statistic of over-identifying restrictions, which tests for the absence of correlation between the instruments and the error term. Additionally, we use the m_2 statistic, developed by Arellano and Bond (1991), in order to test for lack of second-order serial correlation in the first-difference residuals. Finally, Tables 7 to 11 provide two or three Wald tests as well. z_1 is a test of the joint significance of the reported coefficients; z_2 is a test of the joint significance of the time dummies; and z_3 is a test of the joint significance of the country dummies. Note that this last test is only performed in models including several countries.

4. Results: Investment and financial insolvency

4.1. Investment and ex ante financial insolvency costs

Before studying the relationship between investment and ex ante financial insolvency costs, we have estimated our basic specification in (2) for the five countries included in our analysis. The results are given in Table 5.

<Insert Table 5 about here>

The first column displays the results for US firms, which support our basic model. That is, there is a dynamic in the model, since the coefficient on the lag of the dependent variable is significant, and both cash flow and Tobin's q are positively related to investment. The positive relationship between Tobin's q and investment indicates that firms react by undertaking new investment whenever the market reveals valuable investment opportunities. This result is consistent with previous literature, such as Fazzari et al. (1988), Hayashi and Inoue (1991), Vogt (1994), Faroque and Ton-That (1995), Chapman et al. (1996) or Agung (2000), among others. In agreement with Fazarri, Hubbard and Petersen (1988) and subsequent papers, the coefficient on cash flow represents the sensitivity of investment to fluctuations in cash flow. Consequently, the positive coefficient obtained supports the pecking order and the free cash flow theories.

Moreover, the specification of our basic model is supported by all the tests described in Section 3.2. The Sargan test rejects the correlation between the instruments and the error term, and the m_2 statistic rejects the existence of second-order serial correlation. Although m_1 shows that there is first-order serial correlation in the differenced residuals, this is due to the transformation of the models and, therefore, does not represent a specification problem. The remainder of the columns in Table 5 provide the results for UK, German, French and Spanish firms, respectively. These estimates are quite similar to those of the US firms discussed above, hence we can conclude that our basic specification is suitable for analysing the relationship between investment and ex ante financial insolvency costs.

Table 6 presents the estimation results of the model extended by incorporating our measure of the ex ante financial insolvency costs. The first column of the table displays the results for US firms. Estimates for the coefficients on Tobin's q and cash flow are quite similar to those discussed above. As expected, the results for the extra variable show that there is an inverse relationship between investment and ex ante financial insolvency costs. In other words, we find that ex ante financial insolvency costs discourage US firms from undertaking investment projects. As shown in the remaining columns of Table 6, ex ante financial insolvency costs negatively affect the investment undertaken by UK, German, and French firms as well. Unfortunately, the extended model in (3) cannot be performed for Spanish firms, because of the lack of data to proxy intangible assets, including goodwill in the CNMV.

<Insert Table 6 about here>

To sum up, the estimation results in Table 6 verify Hypothesis 1 of the negative relationship between investment and ex ante financial insolvency costs. We can now analyze in which ways governments can mitigate such a negative effect.

4.2. Investment and financial insolvency codes

To learn whether or not country differences affect investment, and to what extent this effect is caused by differences in ex ante insolvency costs, we have performed our basic and extended models in equations (2) and (3) by joining all the country observations. This allows us to introduce country-specific effects (c_i), and thus the specifications to be tested are as follows:

$$\left(\frac{I}{K}\right)_{it} = \beta_1\left(\frac{CF}{K}\right)_{i,t-1} + \beta_2 q_{i,t-1} + \beta_3\left(\frac{I}{K}\right)_{i,t-1} + \eta_i + d_t + c_i + \tau_{it} \quad (7)$$

$$\left(\frac{I}{K}\right)_{it} = \beta_1\left(\frac{CF}{K}\right)_{i,t-1} + \beta_2 q_{i,t-1} + \beta_3\left(\frac{I}{K}\right)_{i,t-1} + \beta_4 EAIC_{i,t-1} + \eta_i + d_t + c_i + \tau_{it} \quad (8)$$

Table 7 provides the estimation results. The first column of the table shows the results for equation (7) without country dummy variables, which are quite similar to those obtained for each individual country. That is, cash flow and investment opportunities are positively related to investment. Both relations are confirmed by the estimates for this equation including country dummy variables, which are displayed in the second column of Table 7. It is worthwhile noting that the Wald test z_3 indicates a high joint significance of the country dummies, thus supporting the prediction in Hypothesis 2 about the relevance of institutional differences across countries for the analysis of investment decisions.

<Insert Table 7 about here>

To validate the second part of Hypothesis 2, ex ante insolvency costs must be controlled for in the investment equation. As we already commented on, the ex ante insolvency cost variable cannot be computed for Spanish firms; therefore, they have been removed from this analysis[9]. The third column of Table 7 presents the estimation results of equation (7) without Spain, which are very similar to those concerning the full sample (see the first column of the table). Similarly, the estimates of this equation including the country-specific effect but excluding Spain, reported in the fourth column, confirm those for the full sample (see the second column of Table 7). Finally, the estimation results for equation (8) are provided in the last column of the table. Consistent with Hypothesis 2, these results show lower joint

[9] Spanish firms are maintained in the remaining analyses performed in this paper. Note that the Spanish case is crucial for subsequent analyses since, besides the French insolvency law, the Spanish law is the only one that allows reorganization without creditors' consent.

significance of the country dummies after controlling for ex ante insolvency costs. That is, part of the effect of institutional differences across countries on firms' investment is the consequence of the differences in ex ante insolvency costs borne by firms across countries.

Relying on the previous results about the effect of ex ante insolvency costs on investment, we now turn our attention to the role played by financial insolvency codes. With this motivation, we study the effect of the several features characterizing insolvency codes across countries by estimating the following model:

$$\left(\frac{I}{K}\right)_{it} = \left(\beta_1 + \gamma_1 DC_i\right)\left(\frac{CF}{K}\right)_{i,t-1} + \beta_2 q_{i,t-1} + \beta_3\left(\frac{I}{K}\right)_{i,t-1} + \eta_i + d_t + c_i + \tau_{it} \qquad (9)$$

where DC_i is a dummy variable that takes a value of one when the firm belongs to a country whose financial insolvency code complies with a certain characteristic according to the information provided in Table 1, and zero otherwise.

The first characteristic relates to the absolute priority rule and, in this case, DC_i takes value 1 when the firm belongs to a country whose financial insolvency code violates the absolute priority of secured creditors (France, Spain and the US), and 0 otherwise. As shown in the first column of Table 8, the sensitivity of investment to fluctuations in cash flow of firms belonging to a country whose insolvency code violates the absolute priority rule (0.0465+0.0674=0.1139, which is significantly different from zero, since the null hypothesis of the linear restriction test is rejected, see t_1 in Table 8) is greater than that of the remaining firms (0.0465). This greater sensitivity is interpreted as a consequence of the following two problems. First, when financial insolvency codes allow some non-secured creditors to rank first in the distribution of proceeds, the risk of bondholders will increase and, consequently, a higher risk premium will be required. Second, this premium also rises because the violation of absolute priority increases the bias of shareholders in favour of riskier investment projects, giving rise to the well-known problem of asset substitution. In both cases, an underinvestment process is likely to arise.

<Insert Table 8 about here>

The second characteristic relates to automatic stay. In this case, DC_i equals 1 if the firm belongs to a country whose financial insolvency code imposes an automatic stay (the US and France), and 0 otherwise. As can be seen in the second column of Table 8, the automatic stay increases the sensitivity of investment to fluctuations in cash flow, since the coefficient on cash flow for firms belonging to countries with automatic stay (0.0523+0.0487=0.1010, which is significantly different from zero, see t_1) is greater than that for the others (0.0523). This result is explained by the fact that automatic stay could prevent bondholders from gaining possession of their security, increasing the risk they face. Thus, bondholders will require a higher risk premium, which may discourage firms from borrowing new money to undertake new projects (i.e. an underinvestment process may arise).

The third characteristic analysed refers to seeking protection from creditors by filing for reorganization without their consent. Thus, DC_i takes value 1 if management can file for reorganization without creditors' consent (France and Spain), and 0 otherwise. The estimation results of equation (9) including this dummy are provided in the third column of Table 8. The coefficient on cash flow for firms belonging to countries whose codes embody this characteristic (0.0624+0.1543=0.2167, which is significantly different from zero, see t_1) is greater than the coefficient obtained for the other companies (0.0624). This result indicates that the possibility of reorganization without creditors' consent leads to higher investment-cash flow sensitivities, thus increasing the risk of underinvestment. It is worthwhile emphasizing that previous estimates of the $(\beta_1+\gamma_1)$ coefficient were nearly double those of β_1. However, the investment-cash flow sensitivity of firms with reorganization without creditor's consent more than triples that of the other firms. From our point of view, this result indicates that allowing the reorganization without the creditors' consent substantially increases bondholders' risk and, therefore, this characteristic plays a crucial role in the underinvestment problem.

Finally, creditors' lack of control when the firm files for reorganization facilitates underinvestment as well. We have thus defined a dummy variable, DC_i, that equals 1 if the insolvency code does not give control to creditors when the firm files for reorganization (France, Spain, the US and Germany), and 0 otherwise. The last column of Table 8 shows that the sensitivity of investment to cash flow is greater when creditors do not control firms in reorganization (0.0473+0.0668=0.1141, which is significantly different from zero, see t_1, versus 0.0473). Note that the weight of the coefficient on cash flow for firms exhibiting this characteristic is three times that for the remaining firms. That is, creditors' lack of control when the firm files for reorganization is more relevant in underinvestment processes than the violation of the absolute priority rule and the automatic stay, but it is less important than reorganization without creditors' consent. This last result is somehow unexpected, since the negative consequences of the reorganization without creditors' consent should be lower than those of not giving control to creditors. The explanation for this conflicting result is that those codes that do not give control to creditors when the firm files for reorganization are also lenient codes (see the last column of Table 8) and, therefore, the negative consequences (i.e., underinvestment processes) of creditors' lack of control are partially offset by the higher investment levels encouraged when the management stays in cases of financial insolvency.

4.3. Robustness check

The Sargan tests reported in Table 8 are significantly higher than those of previous estimates. This increment in the Sargan tests' values could be caused by either a bad choice of the instruments or the aggregation of firms from several countries. To address this question, we have checked the estimation by using different groups of instruments. Since the results obtained are very similar to those discussed above, we conclude that there is no problem with the instruments chosen.

We have thus developed an alternative econometric strategy in order to test Hypothesis 3. This strategy consists of estimating the same model twice, first using firms from countries whose financial insolvency codes embody each of the characteristics analyzed, and second using firms from the remaining countries. However, this new strategy is less suitable for comparing the coefficients estimated for both types of firms. We have thus calculated the elasticity for such coefficients[10] in order to perform the comparison by using the following elasticity index:

$$ei_{cf} = \frac{h_{cf}}{h_{cf} + h_q}$$

where h_{cf} is the elasticity of the coefficient on cash flow, and h_q is the elasticity of the coefficient on Tobin's q. Both elasticities are added in the denominator because cash flow and Tobin's q are the theoretical determinants of a firm's investment according to our model.

Tables 9 and 10 provide the estimation results of the investment model using this new econometric strategy. Note that the information in Table 1 has been used to separate the sample, instead of constructing dummy variables. The first column of Table 9 displays the estimates for firms belonging to a country whose insolvency code violates the absolute priority rule, while the second column shows the results for the remaining firms. These results allow us to compare the importance of cash flow in explaining a firm's investment by

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[10] Elasticities are computed using the following formula $h_k = b_k \frac{\overline{x_k}}{b'\overline{x}}$, where *k* stands for the variable, b_k denotes its coefficient, $\overline{x_k}$ is its mean, and $b'\overline{x}$ is the estimate of the expected value for the dependent variable using the mean values of regressors.

computing our elasticity index. This index is greater for firms belonging to a country whose insolvency code violates the absolute priority rule (ei_{cf} = 0.1925) than for the others (ei_{cf} =0.1799); hence the former suffer from more underinvestment problems than the latter. This evidence confirms the results presented in the first column of Table 8. Furthermore, the implementation of this second strategy shows that the observed increment in the Sargan tests was caused by the aggregation of countries, since they are now similar to those of previous estimates. Therefore, there is no significant correlation between the instruments and the error term, and the instruments used are robust.

<Insert Tables 9 and 10 about here>

The estimation results of the investment model made by using the remaining characteristics to split the sample are quite similar. As shown in the third and fourth columns of Table 9, the elasticity index is greater for firms belonging to countries whose insolvency code imposes an automatic stay (ei_{cf} = 0.2700) than for firms in the rest of the countries (ei_{cf} = 0.2104). Similarly, the first and second columns of Table 10 show that the elasticity index is higher when the financial insolvency code gives legal coverage to seek protection from creditors by filing for reorganization without their consent (ei_{cf} = 0.6961 versus ei_{cf} = 0.1893). This result confirms that of the previous estimation strategy, and it thus indicates that the possibility of filing for reorganization without the creditors' consent is the characteristic that most negatively affects a firm's investment. Finally, the third and fourth columns of Table 10 provide results confirming that the elasticity index for firms in countries whose insolvency code does not confer control on creditors when filing for reorganization (ei_{cf} = 0.2776) is greater than that obtained for the rest of the firms (ei_{cf} = 0.1396)[11].

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[11] Additionally, we have performed a second robustness check to make sure that our results are not biased by other institutional factors that could impact on investment. Specifically, the level of development of equity

5. Conclusions

The role played by financial insolvency codes is decisive in that they are expected to promote the most suitable allocations of financial resources by mitigating the costs of financial distress, especially ex ante insolvency costs. In this context, we investigate how financial insolvency codes influence a firm's investment by analysing different characteristics embodied in these codes that give rise to two well-known distortions: underinvestment and overinvestment processes.

Ex ante insolvency costs discourage firms from investing in all the countries analyzed (the US, the UK, Germany, France and Spain). Therefore, the greater the ex ante insolvency costs faced by firms are, the less they invest. This means that governments can avoid economic inefficiencies if laws mitigating ex ante insolvency costs are passed. Note that these costs partially explain the country-specific effect influencing firms' investment, since the magnitude of the effect of a financial insolvency code on investment depends on its own characteristics.

When analysing the characteristics of financial insolvency codes, we find that most of them contribute to underinvestment problems. These characteristics are: violations of the absolute priority rule, automatic stay, reorganization without creditors' consent, and creditors' lack of control of the reorganization process. On the other hand, codes allowing management to stay in cases of financial insolvency, i.e., lenient codes, encourage overinvestment processes.

Finally, although all the above-mentioned characteristics that are expected to give rise to underinvestment problems are found to negatively affect investment, the magnitude of this

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markets, banks and bonds market could affect the level of investment, in that they provide firms with the availability of financing. The results, which support our findings, are available on request from the authors.

effect is different. The most relevant characteristics are those referring to reorganization without creditors' consent, and creditors' lack of control when the firm files for reorganization. Automatic stay and the violation of the absolute priority rule seem to be less decisive.

Appendix

- *Investment*

Investment was calculated according to the proposal by Lewellen and Badrinath (1997) as follows:

Let FA_{it} be the gross book value of the tangible fixed assets of the period t, R_{it} the gross book value of the old assets retired during the year t, ABD_{it} the accumulated book depreciation for the year t, and BD_{it} the book depreciation expense corresponding to year t. Then we have the following equalities:

$$FA_{it}=FA_{it-1}+I_{it}-R_{it} \tag{A1}$$

$$ABD_{it}=ABD_{it-1}+BD_{it}-R_{it} \tag{A2}$$

If we solve Eq. A.2 for R_{it} and substitute it into *Eq*. A.1, we obtain A.3,

$$FA_{it}=FA_{it-1}+I_{it}+ABD_{it}-ABD_{it-1}-BD_{it} \tag{A3}$$

Realigning terms, Eq. A.3 is transformed into expression A.4

$$FA_{it}-ABD_{it}=FA_{it-1}-ABD_{it-1}+I_{it}-BD_{it} \tag{A4}$$

Since $FA_{it}-ABD_{it}=NF_{it}$, i.e. the net fixed assets, the former equation can be rewritten more compactly as in Eq. A.5,

$$NF_{it}=NF_{it-1}+I_{it}-BD_{it} \tag{A5}$$

From which the value of investment can be found:

$$I_{it}=NF_{it}-NF_{it-1}+BD_{it}$$

- *Cash flow*

$$CF_{it}=NI_{it}+BD_{it}+P_{it}$$

where NI_{it} is the net income and P_{it} are the different provisions that the profit and loss account shows.

- *Replacement value of capital*

$$K_{it}=RF_{it}+(TA_{itt}-BF_{it})$$

where RF_{it} is the replacement value of tangible fixed assets, TA_{it} is the book value of total assets and BF_{it} is the book value of tangible fixed assets. The last four terms were obtained from the firm's balance sheet, and the first one was calculated according to Perfect and Wiles (1994).

$$RF_{it} = RF_{it-1}\left[\frac{1+\phi_t}{1+\delta_{it}}\right]+I_{it}$$

for $t>t_0$ and $RF_{it0}=BF_{it0}$, where t_0 is the first year of the chosen period, in our case 1990. On the other hand, $\delta_{it}=D_{it}/BF_{it}$ and $\phi_t=(GCGP_t-GCGP_{t-1})/GCGP_{t-1}$, where $GCGP_t$ is the growth of capital goods prices reported in the Main Economic Indicators, which is published by the Organization for Economic Cooperation and Development (OECD).

- *Tobin's q*

$$Q_{it} = \frac{MVE_{it}+PS_{it}+MVD_{it}}{K_{it}}$$

where MVE_{it} is the market value of common equity; PS_{it} is the book value of the firm's outstanding preferred stock; and MVD_{it} is the market value of debt, which is obtained as the sum of the market value of short term debt ($BVSTD_{it}$) and the market value of long term debt ($MVLTD_{it}$). $BVSTD_{it}$ is proxied by the book value of short term debt, and $MVLTD_{it}$ is calculated as follows:

$$MVLTD_{it} = \left[\frac{1+l_{it}}{1+i_l}\right]^3 * BVLTD_{it}$$

where $BVLTD_{it}$ is the book value of long term debt; i_l is the interest rate of long term debt reported in the Main Economic Indicators; and l_{it} is the average cost of long term debt, defined as $l_{it}= (IPLTD_{it}/BVLTD_{it})$, where $IPLTD_{it}$ is the interest payable on long term debt, which has been obtained by distributing the interest payable between short and long term debt depending on the interest rates. That is:

$$IPLTD_{it} = \frac{i_l * BVLTD_{it}}{i_s * BVSTD_{it} + i_l * BVLTD_{it}} * IP_{it}$$

where IP_{it} is the interest payable, and i_s stands for the interest rate of short term debt, also reported in the Main Economic Indicators.

- *Probability of insolvency*

To proxy the probability of insolvency, we followed the methodology developed by Pindado et al. (2004). This approach is based on Cleary (1999), who adapts Altman (1968) by using a new methodology characterized by the use of stock variables at the beginning of the period and flow variables at the end of the period as explanatory variables. These variables are normalized by the replacement value of total assets at the beginning of the period, instead of the book value used by Cleary (1999). Like Pindado and Rodrigues (2004), the resultant model is more parsimonious than previous models that use discriminant or logistic analysis in order to obtain the probability of financial insolvency, PI_{it}. Specifically, the model proposed for proxying the probability of financial insolvency is as follows:

$$Prob\ (Y>0) = \beta_o + \beta_1\, EBIT_{it}/\, K_{it-1} + \beta_2\, FE_{it}/\, K_{it-1} + \beta_3\, CP_{\,it-1} /\, K_{it-1} + d_{\,t} + \eta_i + u_{\,it}$$

The dependent variable is a binary variable that takes value one for financially distressed companies, and zero otherwise. Like Wruck (1990), Asquith et al. (1994), Andrade and Kaplan (1998) and Whitaker (1999), a company is classified as financially distressed whenever their Earnings Before Interests, Taxes, and Amortizations are lower than their financial expenses. The explanatory variables included in the model are Earnings Before

Interests and Taxes ($EBIT_{it}$), Financial Expenses (FE_{it}), and Cumulative Profitability (CP_{it}); all of them scaled by the replacement value of the total assets (K_{it-1}) at the beginning of the period.

The econometric methodology used to estimate this model can be summarized as follows. Once the econometric specification of the model has been developed according to the financial theory, it is estimated by using panel data methodology (i.e., a panel data model with discrete dependent variable) in order to check the robustness of the model by eliminating the unobservable heterogeneity. Next, the robust model is estimated in cross-section in order to incorporate the individual heterogeneity into the probability of financial insolvency provided by the logit model. Note that the values obtained for the probability of insolvency range from 0 to 1, thus they are a suitable index to proxy the probability of insolvency that stakeholders assign to each firm ex ante.

- *Ex ante financial insolvency costs*

$$EAIC_{it}=PI_{it}EPIC_{it}$$

where $EPIC_{it}$ stands for the ex post financial insolvency costs, proxied by the intangible assets including goodwill.

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Table 1
Financial insolvency codes

This table deals with the financial insolvency codes of the United States, the United Kingdom, Germany, France, and Spain. Panel A classifies the relevant literature describing these codes across countries. Panel B summarizes the main characteristics of insolvency codes that impact on investment.

Panel A: Relevant literature on financial insolvency codes

Country	**Papers**
The United States	Franks and Torous (1989, 1992, 1993), Franks et al. (1996), Kaiser (1996) and White (1996a, 1996b)
The United Kingdom	Franks and Torous (1992, 1993), Franks et al. (1996) and Kaiser (1996)
Germany	Franks et al. (1996), Kaiser (1996) and White (1996b)
France	Kaiser (1996) and White (1996b)
Spain	Ramos (1993) and Sanchez (1993)

Panel B: Main characteristics of insolvency codes that impact on investment

Characteristic	**Countries**	**Investment problem**
Violations of Absolute Priority	US France Spain	Underinvestment
Automatic Stay	US France	Underinvestment
Reorganization without creditors' consent	France Spain	Underinvestment
No control of reorganization process	US France Germany Spain	Underinvestment
Lenient code	US France Germany Spain	Overinvestment

Table 2

Structure of the panels by number of companies and annual observations per country

For each country, data of companies for which the information is available for at least six consecutive years between 1990 and 1999 were extracted. The resultant unbalanced panel comprises 1675 US (13350 observations), 487 UK (3482 observations), 186 German (1501 observations), 128 French (906 observations), and 133 Spanish (1073 observations) non-financial quoted companies.

No. of annual observations per company	**US**		**UK**		**Germany**		**France**		**Spain**		**Total**	
	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies
5	830	166	205	41	85	17	220	44	45	9	1385	277
6	1062	177	348	58	144	24	72	12	30	5	1656	276
7	1246	178	469	67	70	10	28	4	175	25	1988	284
8	1392	174	552	69	104	13	208	26	184	23	2440	305
9	8820	980	2268	252	1098	122	378	42	639	71	13,203	1467
Total	13,350	1675	3842	487	1501	186	906	128	1073	133	20,672	2609

Table 3

Sample distribution by economic sector classification

All companies in our panels were allocated to one of eight broad economic industry groups in accordance with the Economic Sector Code (SIC) reported in Compustat Global Vantage, excluding Financial Services (code 5000). The figures reported in the last two columns were obtained from the panel that results from merging the data of the five countries.

Economic Sector Code (SIC)	**US**		**UK**		**Germany**		**France**		**Spain**		**Total**	
	No. of observations	No. of Companies	No. of observations	No. of Companies	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies	No. of observations	No. of companies
Basic Materials	860	108	423	54	85	10	16	3	152	18	1536	193
Consumer – Cyclical	3306	412	1009	128	461	57	317	45	386	49	5478	691
Consumer – Non Cyclical	1524	191	489	60	276	34	137	19	227	28	2653	332
Health Care	3837	469	752	95	403	51	255	35	0	0	5247	650
Energy	2119	266	402	51	167	20	82	12	122	15	2892	364
Capital Goods	1321	163	576	75	85	11	99	14	136	17	2117	280
Technology	308	43	40	5	24	3	0	0	50	6	422	57
Communication and Transportation	175	23	151	19	0	0	0	0	0	0	326	42
Total	13,350	1675	3842	487	1501	186	906	128	1073	133	20,672	2609

Table 4

Summary statistics by country

$(I/K)_{it}$ denotes investment, $(CF/K)_{it}$ is the cash flow, q_{it} is Tobin's q, and $(EAIC)_{it}$ is the ex ante insolvency costs. For each variable and country we report the values of the following statistics: Mean, Standard Deviation, Maximum and Minimum. The last rows are obtained from the panel that results from merging the data of the five countries.

Country	Statistics	$(I/K)_{i,t}$	$(CF/K)_{i,t}$	$q_{i,t}$	$(EAIC)_{i,t}$
USA	Mean	0.0601	0.0645	1.6342	0.0069
	Standard Deviation	0.0847	0.1238	1.2919	0.0335
	Maximum	0.7312	1.1679	14.9613	0.7312
	Minimum	-1.6115	-3.5403	0.1624	0.0000
UK	Mean	0.0455	0.0812	1.5170	0.0013
	Standard Deviation	0.1122	0.0977	0.9559	0.0120
	Maximum	0.8466	0.5233	11.2866	0.2864
	Minimum	-3.1524	-1.2824	0.3015	0.0000
Germany	Mean	0.0569	0.0767	1.2770	0.0019
	Standard Deviation	0.0726	0.0650	0.8585	0.0089
	Maximum	0.5114	0.5541	11.5333	0.2064
	Minimum	-0.4521	-0.4975	0.3574	0.0000
France	Mean	0.0445	0.0698	1.2517	0.0018
	Standard Deviation	0.0613	0.0455	0.8684	0.0057
	Maximum	0.4425	0.2677	11.5291	0.0877
	Minimum	-0.7998	-0.2341	0.4972	0.0000
Spain	Mean	0.0151	0.0473	1.1476	--
	Standard Deviation	0.1468	0.0702	0.8443	--
	Maximum	0.7855	0.6135	13.7740	--
	Minimum	-1.5442	-0.4373	0.2067	--
Total	Mean	0.0541	0.0682	1.5441	0.0052
	Standard Deviation	0.0926	0.1113	1.1507	0.0284
	Maximum	0.8466	1.1679	14.9613	0.7312
	Minimum	-3.1524	-3.5403	0.1624	0.0000

Table 5

Estimation results of the basic specification of the investment model by country

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship, degrees of freedom in parentheses; iv) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship, degrees of freedom in parentheses; v) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; vi) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term, degrees of freedom in parentheses.

	US	UK	Germany	France	Spain
$(CF/K)_{i,t-1}$	0.0330*	0.0873*	0.1066*	0.2549*	0.6636*
	(0.0119)	(0.0131)	(0.0135)	(0.0220)	(0.0247)
$q_{i,t-1}$	0.0067*	0.0288*	-0.0032	0.0019*	0.0248*
	(0.0013)	(0.0043)	(0.0014)	(0.0005)	(0.0020)
$(I/K)_{i,t-1}$	0.1085*	-0.0287*	0.0899*	0.0434*	-0.0484*
	(0.0153)	(0.0062)	(0.0116)	(0.0046)	(0.0051)
z_1	89 (3)	96 (3)	104 (3)	277 (3)	905 (3)
z_2	48 (7)	227 (7)	1077 (7)	1668 (7)	262 (7)
m_1	-7.711	-2.174	-5.057	-1.916	-3.939
m_2	0.648	-1.173	0.722	0.819	-1.971
Sargan	90.76 (81)	86.40 (81)	95.96 (81)	91.90 (81)	88.00 (81)

Table 6

Estimation results of the model extended by incorporating the ex ante financial insolvency costs

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; iv) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; v) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; vi) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term; degrees of freedom in parentheses.

	US	UK	Germany	France
$(CF/K)_{I,t-1}$	0.0246*	0.0824*	0.1039*	0.2350*
	(0.0082)	(0.0094)	(0.0100)	(0.0144)
$q_{i,t-1}$	0.0063*	0.0285*	-0.0033	0.0032*
	(0.0012)	(0.0015)	(0.0015)	(0.0002)
$(I/K)_{i,t-1}$	0.1111*	-0.0343*	0.0672*	0.0316*
	(0.0145)	(0.0055)	(0.0061)	(0.0013)
$EAIC_{i,t-1}$	-0.0651*	-0.2200*	-0.3086*	-0.5579*
	(0.0241)	(0.0274)	(0.0610)	(0.0218)
z_1	98 (4)	796(4)	284 (4)	2619(4)
z_2	48 (7)	912 (7)	2876 (7)	13915(7)
m_1	-7.698	-2.154	-4.860	-1.904
m_2	0.696	-1.267	-0.828	-0.822
Sargan	110.72 (108)	126.18 (108)	122.81 (108)	109.80 (108)

Table 7

Results of the model estimated for all countries according to the country effects and the ex ante financial insolvency costs

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; iv) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; v) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vi) z_3 is a Wald test of the joint significance of the country dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vii) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; viii) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term; degrees of freedom in parentheses.

	Basic model for all countries	Basic model for all countries controlling for country effects	Basic model without Spain	Basic model without Spain controlling country effects	Basic model without Spain controlling for country effects and incorporating ex ante costs
$(CF/K)_{i,t-1}$	0.0583*	0.0632*	0.0507*	0.0525*	0.0469*
	(0.0141)	(0.0142)	(0.0138)	(0.0137)	(0.0107)
$q_{i,t-1}$	0.0082*	0.0082*	-0.0089	0.0090*	0.0083*
	(0.0014)	(0.0014)	(0.0014)	(0.0014)	(0.0013)
$(I/K)_{i,t-1}$	0.0907*	0.0868*	0.0934*	0.0836*	0.0820*
	(0.0125)	(0.0124)	(0.0121)	(0.0119)	(0.0115)
$EAIC_{i,t-1}$					-0.0736*
					(0.0255)
z_1	110 (3)	108 (3)	119 (3)	107 (3)	116 (4)
z_2	173 (7)	171 (3)	188 (7)	158 (7)	151 (7)
z_3		57 (4)		58 (3)	49 (3)
m_1	-6.460	-6.464	-5.778	-5.691	-5.669
m_2	-0.984	-1.096	0.162	0.100	0.050
Sargan	123.3 (81)	121.8 (81)	116.26 (81)	111.79 (81)	148.27 (108)

Table 8

Results for the model estimated for all countries according to the characteristics of the insolvency codes across countries

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. DC_i is a dummy variable that in the first column takes value 1 when the firm belongs to a country with a distortion index higher than the mean, and 0 otherwise. In the remainder of the columns this dummy variable equals 1 if the firm belongs to a country allowing automatic stay, reorganization without creditors' consent, and lack of control by creditors, respectively. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) t_1 is the t-statistic for the linear restriction test under the following null hypothesis: $H_0 = \beta_1 + \gamma_1$; iv) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; v) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vi) z_3 is a Wald test of the joint significance of the country dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vii) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; viii) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term; degrees of freedom in parentheses.

	Distortion index / violation of absolute priority rule	Automatic stay	Reorganization without creditors' consent	Creditors' lack of control / Lenient codes
$(CF/K)_{i,t-1}$	0.0465*	0.0523*	0.0624*	0.0473*
	(0.0095)	(0.0103)	(0.0143)	(0.0093)
$q_{i,t-1}$	0.0066*	0.0071*	0.0088*	0.0065*
	(0.0014)	(0.0014)	(0.0015)	(0.0014)
$(I/K)_{i,t-1}$	0.0925*	0.0904*	0.0836*	0.0939*
	(0.0113)	(0.0108)	(0.0109)	(0.0111)
$DC_{it}(CF/K)_{i,t-1}$	0.0674*	0.0487*	0.1543*	0.0668*
	(0.0262)	(0.0202)	(0.0606)	(0.0255)
t_1	3.837	4.037	3.427	3.984
z_1	130 (4)	137(4)	141 (4)	137 (4)
z_2	144 (7)	151 (7)	166 (7)	134 (7)
z_3	50 (4)	53 (4)	55.(4)	49 (4)
m_1	-6.520	-6.502	-6.528	-6.536
m_2	0.993	-1.021	-1.185	-0.962
Sargan	209.07 (108)	186.48 (108)	159.91 (108)	198.15 (108)

Table 9

Results for the model estimated by dividing countries according to the characteristics of their insolvency codes

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) Elasticities are computed using the following formula $h_k = b_k \frac{\overline{x_k}}{b'\bar{x}}$, where k stands for the variable, b_k is its coefficient, $\overline{x_k}$ is its mean, and $b'\bar{x}$ is the estimate of the expected value for the dependent variable using the mean values of regressors; iv) the elasticity index is defined as $ei_{cf} = \frac{h_{cf}}{h_{cf} + h_q}$, where h_{cf} is the elasticity of cash flow, and h_q is the elasticity of Tobin's q; v) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vi) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vii) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; viii) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term; degrees of freedom in parentheses.

	High distortion index / violation of absolute priority rule	Low distortion index / absolute priority rule	Automatic stay	No automatic stay
$(CF/K)_{i,t-1}$	0.0370* (0.0121)	0.1237* (0.0183)	0.0474* (0.0137)	0.1024* (0.0158)
$q_{i,t-1}$	0.0063* (0.0013)	0.0229* (0.0038)	0.0055* (0.0013)	0.0212* (0.0033)
$(I/K)_{i,t-1}$	0.1097* (0.0152)	0.0199* (0.0075)	0.1077* (0.0156)	0.0774* (0.0172)
h_{cf}	0.0409	0.2137	0.0543	0.1680
h_q	0.1716	0.9743	0.1549	0.6304
ei_{cf}	0.1925	0.1799	0.2700	0.2104
z_1	91 (3)	95 (3)	85 (3)	81 (3)
z_2	67 (7)	293 (7)	57 (7)	301 (7)
m_1	-7.861	-3.498	-8.369	-2.402
m_2	0.387	-1.374	-0.842	-1.542
Sargan	97.29 (81)	103.57 (81)	101.11 (81)	123.47 (81)

Table 10

Results for the model estimated by dividing countries according to the characteristics of their insolvency codes (continuation)

The dependent variable is the investment undertaken by companies, $(I/K)_{it}$. The regressions are performed by using the panels described in Table 2 for each country. The rest of the information needed to read this table is: i) Heteroskedasticity consistent asymptotic standard error in parentheses; ii) * indicates significance at the 1% level; iii) Elasticities are computed using the following formula $h_k = b_k \frac{\overline{x_k}}{b'\bar{x}}$, where k stands for the variable, b_k is its coefficient, $\overline{x_k}$ is its mean, and $b'\bar{x}$ is the estimate of the expected value for the dependent variable using the mean values of regressors; iv) the elasticity index is defined as $ei_{cf} = \frac{h_{cf}}{h_{cf} + h_q}$, where h_{cf} is the elasticity of cash flow, and h_q is the elasticity of Tobin's q; v) z_1 is a Wald test of the joint significance of the reported coefficients, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vi) z_2 is a Wald test of the joint significance of the time dummy variables, asymptotically distributed as χ^2 under the null of no relationship; degrees of freedom in parentheses; vii) m_i is a serial correlation test of order i using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation; viii) Sargan is a test of the over-identifying restrictions, asymptotically distributed as χ^2 under the null of no correlation between the instruments and the error term; degrees of freedom in parentheses.

	Reorganization without creditors' consent	Reorganization with creditors' consent	Creditors' lack of control / Lenient code	Creditors' control / Harsh codes
$(CF/K)_{i,t-1}$	0.5228* (0.0331)	0.0485* (0.0137)	0.0457* (0.0135)	0.0873* (0.0131)
$q_{i,t-1}$	0.0110* (0.0025)	0.0091* (0.0014)	0.0050* (0.0013)	0.0288* (0.0043)
$(I/K)_{i,t-1}$	0.0211* (0.0073)	0.0890* (0.0119)	0.1139* (0.0148)	0.0287* (0.0062)
h_{cf}	1.0529	0.1565	0.0531	0.1554
h_q	0.4597	0.6692	0.1382	0.9581
ei_{cf}	0.6961	0.1893	0.2776	0.1396
z_1	267 (3)	113(3)	93 (3)	96 (3)
z_2	130 (7)	161 (7)	109 (7)	227 (7)
m_1	-3.792	-5.685	-8.796	-2.174
m_2	-1.540	-0.274	-0.995	-1.173
Sargan	97.00 (81)	112.03 (81)	100.96 (81)	86.40 (81)