Creditors, Plan Confirmations, and Bankruptcy Reorganizations: Lessons from Slovenia

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Abstract

Creditors often critically shape the fate of bankruptcy reorganizations, yet the drivers and implications of creditors' reorganization plan confirmations are still not completely understood. Exploring micro-level data on bankruptcy reorganization proceedings in Slovenia, we find that creditors, above all, demand a credible change in the exercise of control rights. The prospects of plan confirmation are positively associated with debt-to-equity conversion as well as those majority ownership changes that occur during the proceeding and feature a domestic incoming owner. In contrast, we find no evidence that plan confirmation is related to management turnover, majority ownership transfers involving a foreign incoming owner, pre-bankruptcy financial indicators other than leverage, the number of creditors, the value of different types of claims, and even the contractual details for the repayment of claims. The incidence of creditor-induced socially costly filtering failures is quite high, with estimates ranging between 41 and 78% based on the ex-post approach and between 40 and 61% based on the ex-ante approach. Confirmations of plans from non-viable businesses are more prevalent than rejections of plans from viable businesses. Our results provide a novel perspective on the creditors' role in the resolution of business bankruptcy.

Keywords Reorganization bankruptcy · Creditors · Plan confirmation · Control rights · Filtering failures

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1 Introduction

Bankruptcy laws in many jurisdictions give creditors of an insolvent firm a central role in the decision-making over the fate of an insolvent business. In the context of bankruptcy reorganization frameworks modelled after the US Chapter 11, creditors vote on the destiny of the reorganization proposal put forth by the management and ownership of the bankrupt business striving to pursue reorganization.¹ Weighing private benefits against costs, creditors thereby effectively decide whether the insolvent business may pursue restructuring or, alternatively, commence liquidation under which the business is brought to an end and its assets are distributed among the claimants. Importantly, creditors of an insolvent business are therefore endowed not only with the authority to make a choice that seems optimal from their viewpoint. Rather, they are also entrusted with promoting the primary objective of bankruptcy from the social efficiency standpoint: the rehabilitation of temporarily distressed but otherwise viable businesses and the dissolution of non-viable businesses.²

Yet despite the prominent role that creditors occupy within many bankruptcy reorganization frameworks worldwide, both the determinants and the social efficiency implications of creditors' decisions concerning the destiny of the proposed bankruptcy reorganization plans are still not completely understood. This conclusion applies especially in the context of bankruptcy reorganizations in Europe,³ even though many European countries have over the years introduced Chapter 11-like reorganization schemes with the intent to render their insolvency legislation comparatively more debtor-friendly and oriented towards business rescue.^{4, 5}

¹ In contrast, in other bankruptcy systems, such as the French, the decision over the fate of a bankrupt business is much more heavily influenced by the bankruptcy court; see, e.g., Aghion et al. (1992); Couwenberg (2001); Blazy et al. (2011).

² See, e.g., White (1989, 1994); Senbet and Wang (2012).

³ In this spirit, Hotchkiss et al. (2008, p 272) in a survey of the literature focused on US bankruptcy note that 'evidence on bankruptcy reorganization outside the United States is sparse'. This statement remains valid today.

⁴ To our knowledge, Fisher and Martel (1994, 1995) for Canada, Sundgren (1998, pp 184–186) for Finland, Eisenberg and Tagashira (1994, pp 138–139) for Japan, and Radulović (2012, pp 91–92) for Serbia are the only explicit empirical analyses of the creditors' reorganization plan confirmation decision outside of the US. Couwenberg (2001) presents aggregate statistics for plan confirmation rates in selected European countries, but does not explore reorganization-level data and includes in his analysis bankruptcy systems where bankruptcy reorganization outcomes are heavily influenced by the courts or court-appointed administrators. A small set of related contributions explore the predictors of successfully confirmed reorganization versus liquidation bankruptcy in selected European jurisdictions (see, e.g., Sundgren 1998, p 184, Regression 1 in Table 3; Aguiar-Díaz and Ruiz-Mallorquí 2015; Ruiz-Mallorquí and Aguiar-Díaz 2017). In these studies, however, liquidation bankruptcy arises not only as a consequence of the lack of reorganization plan confirmation, but also as an a priori selected mode of insolvency resolution and/or due to business failure after reorganization plan confirmation.

Similarly, only a handful of studies outside of the US offer fully-fledged empirical estimates of the prevalence of socially costly filtering errors (see Sect. 5) that arise either in reorganization bankruptcies (Fisher and Martel 2004; Cepec and Grajzl 2019) or, less directly pertinent to our analysis, in the insolvency system more generally (Camacho-Miñano et al. 2013; Staszkievicz and Morawska 2019). A further set of studies (e.g., Laitinen 2011; Leyman 2012; Leyman et al. 2011; Dewaelhenys and Van Hulle 2009; Mayr et al. 2017; Kärkinen 2019; Ayadi et al. 2021) provide an empirical perspective on some aspect of the filtering success of different bankruptcy reorganization schemes utilized in Europe, but without providing comprehensive estimates of the incidence of different types of filtering failures.

⁵ For a discussion of the introduction of bankruptcy reorganizations in Europe, see Blazy et al. (2011). For an insightful discussion of the Chapter 11 model of bankruptcy, see Couwenberg and Lubben (2015).

At least in part, the identified lack of research in the broader European setting has been a direct consequence of the overall dearth of fine-grained, micro-level data with the potential to illuminate what takes place during the unfolding of bankruptcy reorganization proceedings and specifically creditors' decision-making on the merit of the proposed reorganization plans.

Taking a step toward filling the resultant gap in the existing literature, in this paper we cast novel light on the creditors' plan confirmation decision and the social efficiency repercussions of the creditors' choice. To this end, we examine a unique dataset on bankruptcy reorganizations filed in Slovenia, a small EU Member State with a socialist past. In the comparatively understudied Slovenia, corporate insolvency in general and bankruptcy reorganization in particular have occupied a prominent place in policy debates during the post-socialist transition, upon EU accession, and in the aftermath of the global financial crisis.⁶ Most recently, policy discourse about the role and functioning of bankruptcy rules has been reignited as a consequence of the COVID-19 pandemic. Systematic empirical evidence on the workings and outcomes of insolvency proceedings, however, remains scant.⁷ Especially little is known about the positive and normative aspects of creditors' decisions in bankruptcy reorganizations, the legal framework for which incorporates many of the features of the US Chapter 11 but gives creditors an even greater power over decisions concerning the reorganization plan.⁸

Our data contain a plethora of covariates on the characteristics of the bankrupt businesses and their reorganization plans, at a level of detail rarely available to researchers. An especially noteworthy feature of our dataset is the incorporation of information about managerial turnover and ownership changes in bankrupt businesses. To our knowledge, no prior research has been able to explore the role of management and ownership changes for creditors' decision to confirm or reject a reorganization plan, even though scholars have long emphasized that bankruptcy cannot be studied without paying heed to the managerial and ownership structures of the businesses that are the users of the bankruptcy laws.⁹ Our data offer the first empirical insight into the importance of managerial turnover and ownership change for creditors' plan confirmation decisions. In particular, the data allow us to assess

⁶ See Gray and Stiblar (1993); Cepec (2014).

⁷ Cepec and Grajzl (2019) measure the extent of filtering failures in Slovenian simplified financial reorganization proceedings used by small businesses. Within the same context, Cepec and Grajzl (2021) examine the impact of managerial turnover and ownership change for the post-bankruptcy failure of small businesses. Cepec and Grajzl (2020) assess the effect of debt-to-equity conversion in bankruptcy reorganization for the post-bankruptcy survival of Slovenian businesses. This last contribution draws on the same underlying data source as the present paper, but unlike the present paper does not examine the determinants of the creditors' plan confirmation decision, does not estimate the extent of socially costly filtering failures, and does not utilize newly-included data on managerial turnover and ownership changes as well as on details of the proposed reorganization plans.

⁸ See Plavšak (2014) on the influence of Chapter 11 as a model for the Slovenian bankruptcy reorganization framework.

⁹ See, e.g., Pistor (2000); Franken (2004).

the relevance of managerial and ownership changes both with regard to their timing (shortly before versus during the proceedings) as well as with regard to the type of the incoming manager (insiders versus outsiders) and the origin of incoming owners (domestic versus foreign).

Similarly, when focusing on the normative aspect of a creditors' plan confirmation decision, we utilize recently-updated information on the post-bankruptcy survival status of the businesses with confirmed reorganization plans. The resulting data allows us to capture an especially natural and salient aspect of the viability of a business, that embodied in the ability of the business to survive as a going concern. Consequently, we are able to provide an analysis of the extent to which creditors promote the social efficiency-enhancing objectives of the promotion of restructuring viable businesses and the liquidation of non-viable ones.

The rest of the paper is organized as follows. In Sect. 2, we provide the necessary institutional background on Slovenian bankruptcy reorganizations.¹⁰ Section 3 introduces our data. In Sect. 4, we explore the determinants of creditors' plan confirmation decisions. The resulting analysis illuminates which features of reorganization plans and bankrupt businesses systematically predict a creditors' plan confirmation. In Sect. 5, we then investigate the social efficiency repercussions of the creditors' plan confirmation decision. Drawing on the existing literature, we provide estimates based on two different approaches to assessing the adequacy of the creditors' decisions from the social efficiency perspective. Finally, Sect. 6 concludes.

2 Bankruptcy Reorganization in Slovenia

The Slovenian corporate bankruptcy law¹¹ allocates the initial choice between the reorganization versus the liquidation of an insolvent business to the initiator of the proceedings—the debtor or creditors—rather than the courts (as is the case in France or Germany).¹² If reorganization is chosen, the resulting proceedings, referred to as the 'compulsory settlement proceedings' (*prisilna poravnava*), share many features of the US Chapter 11, but give the creditors an even more influential role.¹³

Our focus is on the period after the enactment of the 2008 legislation that laid the foundation for the present-day insolvency practice. Subsequent amendments updated specific provisions of the 2008 insolvency law but did not modify the core of the corporate bankruptcy resolution framework. A 2013 amendment introduced a streamlined bankruptcy reorganization alternative, referred to as 'simplified

¹⁰ Elements of that section draw on an analogous overview in Cepec and Grajzl (2020).

¹¹ The pertinent law is referred to as *Zakon o finančnem poslovanju, postopkih zaradi insolventnosti in prisilnem prenehanju* (ZFPPIPP) and is available online at <http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO4735>. In English, the law has been referred to as the Financial Operations, Insolvency Proceedings, and Compulsory Dissolution Act. A 2008 version of the law that does not incorporate the 2013 amendments is available online at <https://www.iiglobal.org/sites/default/files/sloveniafinancialoperations.pdf>.

¹² Arts. 139 and 231 of ZFPPIPP.

¹³ Sec. 4.7 of ZFPPIPP, Art. 221a–221g.

compulsory settlement proceedings' (*poenstavljená prisilna poravnava*), intended specifically for small businesses.¹⁴ Relative to the regular compulsory settlement proceedings, the simplified compulsory settlement proceedings entail substantively different rules and procedures, including the preclusion of the possibility of debt-to-equity conversion, the absence of a bankruptcy trustee, and, notably, a lack of verification of the creditors' claims,¹⁵ a peculiar feature that may have created incentives for fraudulent behaviour. Due to their limited comparability with the regular compulsory settlement proceedings, the simplified compulsory settlement proceedings are not the object of interest in the present paper. The businesses that attempted reorganization under the simplified compulsory settlement proceedings scheme are therefore purposefully not included in our data.¹⁶

2.1 The Proceedings

An insolvent business has the option to either attempt reorganization or enter into liquidation.¹⁷ As under Chapter 11, creditors cannot impose the debtor's liquidation if the debtor desires to pursue reorganization. Reorganization proceedings are typically initiated by the debtor, although creditors can initiate the proceedings as well.¹⁸ A reorganization filing at the pertinent district court must include key financial statements, a synopsis of the reorganization plan, and an auditor's affidavit certifying that the creditors can be expected to recover more of their claims through reorganization than via liquidation.¹⁹

Reorganization proceedings commence with a court order. As under Chapter 11, bankruptcy filing activates the automatic stay injunction that halts all claims vis-à-vis the debtor.²⁰ Unlike under Chapter 11, no class of creditors can apply for an exemption from the automatic stay.²¹ Resonating with the US system, but differing from the French or German system, the Slovenian bankruptcy reorganization framework abides by the debtor-in-possession paradigm. The debtor's management therefore by default remains in control of the business.²²

The court appoints a licensed bankruptcy trustee.²³ The trustee verifies the creditors' claims, monitors the debtor's business affairs, and oversees the creditors'

¹⁴ The applicable amendment is referred to as *Zakon o spremembah in dopolnitvah Zakona o finančnem poslovanju, postopkih zaradi insolventnosti in prisilnem prenehanju* (ZFPPIPP-E), or in English: Act Amending the Financial Operations, Insolvency Proceedings, and Compulsory Dissolution Act-Version E. An online version of the amendment (in Slovene only) is available at <http://pisrs.si/Pis.web/pregledPredpisa?id=ZAKO6507>.

¹⁵ Art. 221b of ZFPPIPP.

¹⁶ For an overview and the functioning of the Slovenian simplified bankruptcy reorganization procedure for small businesses, see Cepec and Grajzl (2019, 2021).

¹⁷ Arts. 152 and 236 of ZFPPIPP.

¹⁸ Art. 221j of ZFPPIPP.

¹⁹ Art. 141 of ZFPPIPP.

²⁰ Sec. 3.8 of ZFPPIPP.

²¹ Ibid.

²² Art. 151 and 151a of ZFPPIPP.

²³ Art. 116 of ZFPPIPP.

voting on the reorganization proposal. The trustee, however, possesses no substantive decision-making powers with regard to the debtor's business and reorganization per se. In particular, in contrast to Chapter 11, the trustee never assumes authority over the debtor's affairs and reorganization. Until 2013, the courts appointed trustees based on alphabetical order from the list of licensed trustees. Subsequent amendments introduced the option for the court to appoint a trustee of its own choice and for the creditors' committee to petition for a change of trustee.²⁴

The court, too, assumes a primarily supervisory role. At the filing stage, the court can dismiss a petition to reorganize, but only on procedural grounds.²⁵ At the stage of plan confirmation versus rejection, the court is legally mandated to affirm a plan that has received support from the required creditor majority and is legally precluded from affirming a reorganization plan that was not endorsed by the required creditor majority.²⁶ Thus, unlike under Chapter 11, where courts evaluate the feasibility of the reorganization plan and have the leeway to implement a cramdown (the imposition of a reorganization plan despite objections by certain classes of creditors), in Slovenian reorganization proceedings the court does not make any decisions regarding the merit and the substance of the reorganization proposal.²⁷ In the Slovenian system of bankruptcy reorganization, the decision to confirm or reject a proposed reorganization plan is in the exclusive hands of the creditors.²⁸

2.2 The Reorganization Plan

The reorganization plan is ordinarily prepared by the debtor.²⁹ A conventional reorganization plan may encompass the reduction and/or the postponement of the repayment of debt held by ordinary unsecured creditors (suppliers, customers, and contractors). The minimum amount and timing of repayment have occasionally been regulated by law. Presently, no such rules are in place. Claims by secured creditors (who have their claims secured by a lien) can be the subject of a conventional reorganization plan since 2013. Normally, a reorganization plan may impact secured claims only via a postponement of repayment and/or an altered interest rate. Any other changes pertaining to secured claims (such as the reduction of debt) require the individual consent of the pertinent secured creditors. Priority unsecured claims (by employees entitled to arrears in wages and social security contributions) and excluded claims (typically from owners of property leased to the debtor) are legally omitted from the reorganization plan.³⁰

²⁴ Ibid.

²⁵ Art. 153 of ZFPPIPP.

²⁶ Art. 209 of ZFPPIPP.

²⁷ As noted by Cepec and Grajzl (2019, 2020), the limited role of the courts in Slovenian reorganization proceedings is best understood as a reflection of the legislator's long-standing mistrust in the judiciary when it comes to substantive decisions pertaining to corporate bankruptcy.

²⁸ Sec. 4.4.5 of ZFPPIPP.

²⁹ Creditors propose a reorganization plan only if they initiate the reorganization proceedings (Art. 141 of ZFPPIPP).

³⁰ Art. 221n of ZFPPIPP.

As in the case of Chapter 11, the Slovenian bankruptcy legislation provides a possibility for debt-to-equity conversion.³¹ Until 2013, the law did not specify any conditions on when the debtor should propose the debt-to-equity conversion possibility.³² A 2013 amendment, however, stipulates that the creditors must have the option of debt-to-equity conversion if the business exhibits a negative working capital. The exact rate for conversion of debt into equity depends on the specific offer. If the offer entails conversion of secured claims, secured creditors are entitled to a conversion rate that is more favourable than that intended for other creditors. In the case of joint-stock companies, the offer must specify the type of shares (ordinary, preferred) received by the creditors who concur with debt-to-equity conversion.³³ Debt-to-equity conversion pursued by some of the creditors does not preclude the possibility of conventional reorganization for the remaining creditors.

If debt-to-equity conversion takes place, the ownership share of original owners is diluted with new shares. Before 2013, the implementation of debt-to-equity conversion required the consent of the debtor's owners who jointly possessed at least a three-quarter ownership stake. After a 2013 amendment, which introduced the absolute priority rule (creditors' claims must be paid first), the share of old owners automatically drops to zero whenever the business exhibits a negative working capital.³⁴

2.3 The Plan Confirmation Decision

A reorganization plan is confirmed only if it receives support from the required majority of creditors affected by the plan. If the reorganization proposal affects both ordinary unsecured and secured creditors, each of the two creditor classes votes separately. For a plan to be confirmed, it must be endorsed by both ordinary unsecured creditors whose claims constitute at least 60% of the value of ordinary unsecured claims affected by the plan and secured creditors whose claims constitute at least 75% of the value of secured claims affected by the plan.³⁵ Priority unsecured creditors and excluded creditors do not vote. In voting on the proposed reorganization plan, the creditors who agree to debt-to-equity conversion hold a disproportionately large weight.³⁶

If the reorganization plan is confirmed by the required creditor majority, it is formally confirmed by the court. The business then begins to execute the confirmed plan. The automatic stay injunction ceases to apply. A new bankruptcy reorganization is in general possible no sooner than 3 years after the fulfilment of obligations from the original bankruptcy reorganization.³⁷ As is the case of Chapter 11, if

³¹ Sec. 4.4.4 of ZFPPIPP.

³² When the proceedings are initiated by the creditors, the debt-to-equity conversion offer is extended by a subset of the creditors.

³³ Art. 144 of ZFPPIPP.

³⁴ Arts. 136, 144, and Sec. 4.4.4 of ZFPPIPP.

³⁵ Sec. 4.4.5, especially Art. 20, and Sec. 4.8.1, especially Art. 221n and 221t, all in ZFPPIPP.

³⁶ Art. 201 of ZFPPIPP.

³⁷ Art. 140 of ZFPPIPP.

the creditors reject the proposed plan, the business immediately enters liquidation bankruptcy.³⁸

3 Data

3.1 Data Sources

Our key data source is court records on bankruptcy reorganizations collected by the Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES). Utilizing the information contained in these records, we first coded variables for the complete set of attempted bankruptcy reorganizations that were filed under the scheme of regular compulsory settlement proceedings, as introduced by the 2008 insolvency legislation, and for which the proceedings had been completed at any point between the introduction of the law in 2008 and September 1, 2018. As emphasized in Sect. 2, the resulting set of attempted bankruptcy reorganizations excludes those filed since 2013 under the procedurally considerably different simplified compulsory settlement proceedings scheme aimed at small businesses only. We then tracked the survival of the businesses covered by our data until March 15, 2020, the beginning of a widespread COVID-19 crisis in Slovenia.³⁹ As we clarify below, the resulting setting ensures an adequately long time-frame to follow the post-bankruptcy survival of businesses with confirmed reorganization plans. This advantageous attribute of our data in turn allows us to explore the incidence of filtering failures that occur in the bankruptcy reorganization process.

We merged the resulting dataset with an additional AJPES dataset containing the businesses' financial and accounting information for the last year prior to reorganization filing. Finally, utilizing a yet further database originating with AJPES, we gathered the information on managerial turnover and major ownership changes for the resulting businesses. We introduce this aspect of our data in the ensuing section. Upon dropping observations with incomplete data, our final sample consists of 202 businesses and their reorganization plans.

3.2 The Sample

Table 1 provides the basic descriptive statistics for our sample. (Table 5 in the Appendix lists the corresponding variable definitions.) As one would have expected, shortly before filing for bankruptcy, a typical business was heavily indebted, unprofitable, and experienced liquidity concerns. The mean assets value of the businesses is €24 million. Medium-sized and large enterprises each account for 25% of the sample. Small and micro businesses respectively represent 30% and 20% of the sample.

³⁸ Arts. 141 and 208 of ZFPPIPP.

³⁹ A COVID-19 epidemic was declared on March 12, 2020. Effective on March 16, the government stopped all public transport, suspended all unnecessary services, and closed all restaurants and bars as well as kindergartens and educational institutions in the country.

Table 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
Outcomes				
Reorganization plan confirmed	0.6287	0.4843	0	1
Survival as going concern	0.2178	0.4138	0	1
Pre-proceedings business characteristics				
Joint-stock company	0.2723	0.4462	0	1
Business age (in years)	17.6	9.7	0.4	54.0
Foreign owned	0.0941	0.2926	0	1
Ownership concentration	0.7592	0.3099	0.0647	1
Assets (in €)	24,226,303.8	69,703,412.5	123,912.0	694,530,000.0
Leverage	1.7183	2.0438	0.4247	24,2283
Liquidity	0.9121	0.4368	0.0402	3,3096
Return on assets	-0.4824	1.2624	-12.9859	0.4041
Proceedings characteristics				
Creditor-initiated proceedings	0.0594	0.2370	0	1
Length of proceedings (in months)	8.34	4.31	0.77	32.00
Number of creditors	376.1	687.9	6	8994
Ordinary unsecured claims (in €)	16,633,475.1	58,209,237.4	181,319.9	566,237,486.5
Priority unsecured claims (in €)	247,762.6	503,285.7	0	5,322,131.0
Secured claims (in €)	11,455,485.1	33,832,408.3	0	363,196,440.3
Excluded claims (in €)	1,284,234.8	4,941,609.3	0	56,904,720.5
Reorganization plan				
Years for repayment of ord. unsec. creditors	4.00	1.68	0.25	13.00
Percent repayment of ord. unsec. creditors	40.1	20.5	1.3	100
Percent repayment of ord. unsec. creditors under liquidation	14.9	14.9	0	78.2
Percent repayment of ord. unsec. creditors relative to liquidation	25.2	18.0	0.6	86.6

Table 1 (continued)

Variable	Mean	Std. Dev.	Min.	Max.
Regular restructuring of secured claims	0.1089	0.3123	0	1
Special restructuring of secured claims	0.0495	0.2175	0	1
Debt-to-equity conversion	0.2723	0.4462	0	1
Management turnover indicators				
Before proceedings, new manager outsider	0.2129	0.4104	0	1
Before proceedings, new manager insider	0.1337	0.3411	0	1
During proceedings, new manager outsider	0.0941	0.2926	0	1
During proceedings, new manager insider	0.0099	0.0993	0	1
Ownership change indicators				
Before proceedings, new owner foreign	0.0050	0.0704	0	1
Before proceedings, new owner domestic	0.0792	0.2707	0	1
During proceedings, new owner foreign	0.0248	0.1558	0	1
During proceedings, new owner domestic	0.1733	0.3794	0	1

The table presents the descriptive statistics for key variables. Estimated models in addition include multiple sets of fixed effects

A total of 48% of the businesses operate in the service sector, with remaining businesses active in manufacturing, agriculture or mining (30%) and the construction industry (22%). Nearly three quarters (73%) of the businesses are limited liability companies, the rest are joint-stock companies. The average age of a business at the start of reorganization is 18 years. The vast majority of businesses are domestically-owned; businesses that entail at least a ten-percent foreign ownership constitute less than ten percent of the sample. The average ownership concentration, as measured by the Herfindahl-Hirschman ownership concentration index, is relatively high.

The vast majority of the reorganization proceedings (94%) are initiated by the debtor. The average length of proceedings from the day of filing to the decision on the fate of the plan is 8.3 months. A reorganization on average entails 376 different creditors, although the variation in this variable is large. Ordinary unsecured claims on average constitute the largest component of the value of all claims. These are followed by secured claims, excluded claims, and priority unsecured claims.

A typical reorganization plan involves a proposal that ordinary unsecured creditors will be repaid in 4 years (the median value). The average proposed repayment is 40.1%. In contrast, the average estimated repayment of ordinary unsecured creditors in the event of liquidation is lower and equals 14.9%. 10.9% of reorganization plans envisage the regular restructuring of secured claims in the form of a postponed repayment or an altered interest rate. Five percent of the plans foresee a special restructuring of secured claims that would impact secured creditors in ways other than via postponed repayment or an altered interest rate. Debt-to-equity conversion is an integral part of more than a quarter (27%) of reorganization plans.

Managerial turnover and ownership change are a common feature of businesses pursuing reorganization, yet their role for bankruptcy outcomes remains underexplored.⁴⁰ Our data allow us to observe both instances of management turnover and ownership change in the businesses under consideration. With respect to management turnover, we distinguish between insider and outsider incoming managers, a critical distinction emphasized in the literature.⁴¹ We classify the incoming manager as an insider if the incoming manager was previously involved with the business as a stakeholder, a director or board member, or a holder of procuration (a company officer with statutory authority); or if the incoming manager and the previous director or majority owner possess the same last name or home address. In all other scenarios, the incoming manager is classified as an outsider.

With regard to ownership changes, we focus on transfers of majority ownership shares. We further narrow down our conceptualization of ownership change by investigating only *de facto* changes in ownership as opposed to *de jure* ownership transfers that in practice are unlikely to result in a substantively different exercise of

⁴⁰ For studies of the relationship between managerial turnover and either the post-bankruptcy performance of businesses or the incidence of bankruptcy, see, e.g., Hotchkiss (1995); Bogan and Sandler (2012); Evans et al. (2014); Kwak et al. (2016); Parker et al. (2002); Cepec and Grajzl (2021). With the exception of Cepec and Grajzl (2021), these contributions fail to account for changes in ownership, even though ownership changes frequently take place around the time of management turnover and exhibit an independent effect on business outcomes (McGuckin and Nguyen 1995).

⁴¹ See, e.g., Huson and Parrino (2010); Schepker et al. (2017).

ownership rights. Accordingly, we do not record a change in ownership if the new and the old majority owner, both natural persons, possess the same last name or home address; if majority ownership was transferred from a natural person to a legal person so that the majority owner of the legal person (the new owner) is the previous owner (a natural person) of the business; or if the new majority owner and the previous owner, both legal persons, have a common majority owner, a natural person. Lastly, we distinguish between instances of above-defined ownership changes where the incoming owner is a domestic versus foreign natural or legal person, a distinction that has been of substantial interest in the literature on firm performance.⁴² The incoming owner is classified as domestic if the owner is either registered in Slovenia (a legal person) or is a Slovenian permanent resident (a natural person). In all other cases, the incoming owner is classified as foreign.

About 45% of businesses in our sample experience managerial turnover either within a year prior to or during the reorganization proceedings. When managerial turnover occurs, the new incoming managers are more often outsiders than insiders. Similarly, about 28% of businesses experience a *de facto* ownership change. For those businesses, the vast majority of new incoming owners are domestic rather than foreign. The few incoming foreign owners, all legal persons, have their domicile in five different European countries (Austria, Croatia, Sweden, Germany, and Luxembourg) and Turkey.

4 Which Plans Do the Creditors Confirm?

From the 202 reorganization plans put forth by the businesses in our sample, the creditors confirm 127 (63%). Are there specific features of the businesses and their reorganization plans that systematically predict creditors' support for the plan? If so, which ones? To address these questions we turn to regression analysis.

4.1 Empirical Approach and Hypotheses

Our outcome variable of interest, Reorganization plan confirmed (RPC), takes on the value of one if the creditors confirmed the reorganization plan and zero otherwise. In the latter case (i.e. in the event of a lack of the creditors' plan confirmation), the business is automatically sent into liquidation.⁴³ Given the binary character of our outcome variable, one conventional approach would be to estimate a logit or a probit. In our context, however, multiple observation-specific or group-invariant indicator variables perfectly predict the outcome of interest. Consequently, both

⁴² See, e.g., Barbosa and Louri (2005).

⁴³ The lack of a plan confirmation is in the overwhelming majority of instances a consequence of the creditors' explicit rejection of the reorganization proposal via creditor voting. In rare scenarios, the plan is formally not confirmed because the debtor, anticipating the creditors' rejection of the proposal, abandons the reorganization plan even prior to the creditor voting assembly. Given that both types of outcomes ultimately reflect creditors' preferences, it is apposite to not explicitly distinguish between them.

probit and logit are underidentified⁴⁴ and therefore estimable only if one drops the culprit covariates and a substantial portion of the sample.⁴⁵ To avoid drawing conclusions on the basis of the inclusion of only a limited set of covariates and a potentially biased subsample, we instead specify the following linear probability model:

$$\text{Prob}(RPC_i = 1|x_i) = \beta x_i \quad (1)$$

where i indexes businesses, x_i is the vector of covariates and fixed effects, and β the corresponding vector of coefficients to be estimated. Unlike a probit or a logit, linear probability model (1) allows us to utilize all of our data and obtain estimates of the coefficients on both observation-specific and group-invariant explanatory variables that perfectly predict the outcome and that cannot be estimated using a probit or a logit. In addition, the coefficient estimates from the linear probability model are readily interpretable as the average marginal effects.⁴⁶ We estimate model (1) using ordinary least squares (OLS). Because the resulting estimation by default gives rise to heteroscedastic errors,⁴⁷ we base statistical inference on appropriately adjusted, heteroscedasticity-robust, standard errors.

We include five broad groups of covariates. The first group entails the basic characteristics of the bankrupt business such as its legal form, age, ownership concentration and origin, as well as core financial indicators recorded shortly before the reorganization filing. We would expect especially the pre-bankruptcy financial indicators to exert an effect on creditors' plan confirmation decision: all else being equal, creditors should be more willing to confirm a plan put forth by businesses experiencing a comparatively less dire financial situation as measured by overall indebtedness (leverage), profitability (return on assets), and liquidity.

The second group of covariates encompasses the characteristics of the reorganization proceedings. We include an indicator for whether the proceedings were initiated by the creditors rather than the debtor and a measure of the length of proceedings (in months). We further add the number of creditors as well as the value of the different types of claims based on creditor type: ordinary unsecured, secured, priority unsecured, and excluded. To smooth out the effect of outliers, all of the resulting covariates enter our model in logged form. All else being equal, we would expect especially the value of different types of claims to predict the creditors' confirmation decision and, quite possibly, different types of claims to affect the confirmation decision differently. Secured creditors, for example, often favour quick liquidation.⁴⁸ In contrast, many ordinary unsecured creditors, as well as excluded creditors

⁴⁴ See Anderson (1987); Oksanen (1986); Caudill (1987, 1988).

⁴⁵ Stata 16, for example, 'checks the model for identification and, if it is underidentified, drops whatever variables and observations are necessary for estimation to proceed' (<https://www.stata.com/manuals/rlogit.pdf>).

⁴⁶ The potential disadvantage of the linear probability model is that the estimated effects may fall outside of the unit interval. As we clarify in Sect. 4.2, this inconvenience does not arise in our context (see also Table 2).

⁴⁷ See, e.g., Wooldridge (2002).

⁴⁸ See White (1989).

and priority unsecured creditors, who do not vote on the reorganization proposal but may exert an influence on the voting creditors, prefer the debtor's reorganization as it facilitates an ongoing business relationship.

The third group of included covariates are the features of the proposed reorganization plan. The offered number of years for the repayment of creditors could impact the ordinary unsecured creditors' confirmation decision non-linearly. Depending on their preferences and assessment of the prospects of successful reorganization, ordinary unsecured creditors may be either more or less willing to confirm proposals that deviate from the customarily proposed repayment period of more than 2 and not more than 4 years. For this reason, we include indicators for whether the proposed number of years for repayment is smaller than or equal to 2 years; greater than four but smaller than 6 years; and greater than 6 years. (The omitted category is a repayment plan that is to be completed in more than 2 and no more than 4 years.)

We include a covariate measuring the difference between the plan-envisaged percent of repayment of ordinary unsecured creditors and the estimated percent of repayment in the event of liquidation. All else being equal, the larger this difference, the more inclined we would expect the ordinary unsecured creditors to be toward confirming the plan. We further add indicators for whether the reorganization plan affects secured creditors, either via a postponement of claim payment and a change in the applicable interest rate (regular restructuring) or via alternative means that require individual secured creditor consent (special restructuring).

As a final covariate in this group, we incorporate an indicator for whether the reorganization plan entails a debt-to-equity conversion. The conversion of debt to equity allows the creditors to increase control over the failing business. As such, debt-to-equity conversion can be an effective means of restructuring financially distressed businesses.⁴⁹ Thus, *ceteris paribus*, we would expect creditors to be relatively more eager to confirm a plan that features (at least some) conversion of debt to equity.

Our fourth and fifth groups of covariates are indicators of management turnover and ownership change. Management turnover and ownership transfers are in practice a salient part of business dynamics, including, or perhaps especially, in the case of financially distressed businesses in search of a path to rehabilitation. Yet even though there is every reason to suspect that at least some of the changes in leadership and control over the business would shape the creditors' views on the future prospects of the bankrupt business, little is known empirically about the relevance of management turnover and ownership change for the creditors' plan confirmation decision. Consequently, rather than articulating specific ex-ante hypotheses with regard to the effect of management and ownership changes, we allow the data to speak for themselves. With respect to both management turnover and ownership change we distinguish between instances prior to and during the proceedings. Concerning management turnover, we further draw a distinction between occurrences when the incoming manager is an insider versus

⁴⁹ See, e.g., Chatterji and Hedges (2001); Cepec and Grajzl (2020).

Table 2 The determinants of creditors' plan confirmation decision

Explanatory variable	Coeff.	Std. Error
Business characteristics		
Joint-stock company	− 0.1178	(0.1075)
Business age (in years)	0.0010	(0.0046)
Foreign owned	0.1934	(0.1285)
Ownership concentration	− 0.0634	(0.1396)
Log assets	− 0.0527	(0.0827)
Leverage	− 0.0658**	(0.0277)
Liquidity	− 0.0402	(0.1204)
Return on assets	− 0.0099	(0.0407)
Proceedings characteristics		
Creditor-initiated proceedings	0.0140	(0.2070)
Length of proceedings (in months)	0.0214*	(0.0123)
Log number of creditors	0.0397	(0.0595)
Log ordinary unsecured claims (in €)	0.0047	(0.0676)
Log secured claims (in €)	0.0074	(0.0121)
Log priority unsecured claims (in €)	− 0.0082	(0.0189)
Log excluded claims (in €)	− 0.0049	(0.0079)
Reorganization plan		
≤ 2 years for repayment of ord. unsec. creditors	0.1232	(0.1302)
4 < years for repayment of ord. unsec. creditors ≤ 6	0.0859	(0.1397)
> 6 years for repayment of ord. unsec. creditors	− 0.0238	(0.1428)
Percent repayment of ord. unsec. creditors relative to liquidation	− 0.0022	(0.0026)
Regular restructuring of secured claims	− 0.0397	(0.2619)
Special restructuring of secured claims	0.0386	(0.2537)
Debt-to-equity conversion	0.2408**	(0.0996)
Management turnover indicators		
Before proceedings, new manager outsider	− 0.0379	(0.0984)
Before proceedings, new manager insider	− 0.0169	(0.1138)
During proceedings, new manager outsider	0.0619	(0.1410)
During proceedings, new manager insider	− 0.1583	(0.2981)
Ownership change indicators		
Before proceedings, new owner foreign	0.4473	(0.3757)
Before proceedings, new owner domestic	− 0.1678	(0.1271)
During proceedings, new owner foreign	0.0466	(0.2020)
During proceedings, new owner domestic	0.3142***	(0.1017)
Fixed effects (with p-value for test of joint significance)		
Industry FE	Yes ($p = 0.651$)	
Business size classification FE	Yes ($p = 0.512$)	
Court FE	Yes ($p = 0.615$)	
Trustee proceeding FE	Yes ($p = 0.945$)	
Year of filing FE	Yes ($p = 0.244$)	
R-squared	0.4108	

Table 2 (continued)

Explanatory variable	Coeff.	Std. Error
Observations	202	

The table presents coefficient estimates and heteroscedasticity-robust standard errors based on OLS estimates of a linear probability model where the outcome variable is the binary indicator Reorganization plan confirmed. The omitted category for years for the repayment of ordinary unsecured creditors are plans with proposed time for repayment exceeding two and not exceeding four years

***, **, and *Denote statistical significance at the 1%, 5%, and 10% level, respectively. For fixed effects, the reported *p*-value is for the F-test of joint significance

an outsider. Regarding ownership change, we differentiate between scenarios where the incoming owner is domestic versus foreign.

Notably, ownership changes that occur during the proceedings are in principle unrelated to instances of debt-to-equity conversion, for two major reasons. First, the amount of debt converted into equity when debt-to-equity conversion takes place is in general not large enough to imply a change in control ownership. Second, changes in majority ownership during the proceedings can and do occur independently of debt-to-equity conversion considerations. Thus, even though debt-to-equity conversion and ownership changes during the proceedings are positively correlated, they capture different aspects of the reallocation of control rights within the bankrupt business. As we argue in the ensuing section, the resulting positive correlation also does not give rise to multicollinearity concerns. In our estimates, we are able to discern separate statistically significant effects of both debt-to-equity conversion and specific instances of ownership change.

To minimize omitted variable bias we further include multiple sets of fixed effects. Industry and size classification fixed effects control for additional potentially important characteristics of the business. Court-fixed effects control for any effects of the supervising court and of time-invariant regional specifics on reorganization outcomes. Fixed effects for the year of filing absorb country-wide macroeconomic shocks as well as any changes in the pertinent law. The final set of fixed effects, for the number of reorganization proceedings that the appointed bankruptcy trustee has overseen during the time-period of our analysis, captures the extent to which a trustee's commitment to multiple ongoing proceedings impacts the trustee's ability to perform the supervisory role in the given proceedings and, thus, potentially affects reorganization outcomes.

4.2 Results and Discussion

Table 2 reports the regression results in the form of the estimated coefficients—marginal effects—and corresponding (robust) standard errors. We emphasize that despite the plethora of included covariates and fixed effects, we view these results as primarily exploratory in character rather than capturing pure causal effects. That

is, given the non-experimental character of our data, we are unable to fully rule out the existence of additional unobserved factors related to the nature of the bankrupt business, the reorganization plan, or the proceedings that, on the one hand, correlate with the covariates included in the estimated model and, at the same time, exert an independent effect on the creditors' plan confirmation decision. Subject to this caveat, however, the following conclusions emerge.

First and perhaps most important, the prospects of plan confirmation are positively associated with those features of the plan and characteristics of the business that, according to the creditors' view, foreshadow an effective and credible change in the exercise of control rights. Based on our estimates, debt-to-equity conversion, a fundamental feature of the reorganization proposal, is associated with a 24.1 percentage point increase in the likelihood of plan confirmation. (The baseline probability of plan confirmation is equal to 62.9%). Likewise, transfers of ownership that take place during the proceedings and feature a domestic incoming owner are a statistically significant predictor of plan confirmation. The arrival of a new domestic owner during the reorganization proceedings is associated with a 31.4 percentage point increase in the chances of proposal confirmation.

Yet not all ownership changes exert an effect on the prospects of plan confirmation: both the timing of ownership changes and the origin of the incoming owner appear to matter. Based on our estimates, the creditors are neither swayed by an early (pre-proceedings) arrival of a new majority domestic owner nor by the entry of a new foreign majority owner, regardless of the timing of the new foreign owner's seizure of control over the business. Our results on the lack of an effect of foreign incoming owners thus resonate with the findings in the literature on multinational enterprises, foreign listings, and venture capital that point to the relevance of the 'liability of foreignness' in specific business settings.⁵⁰ Similarly, we find no evidence that the prospects of creditors' plan confirmation are affected by management turnover. The estimates on all four management turnover indicators are statistically insignificantly different from zero.

Second, the extent of indebtedness (leverage) of the business shortly prior to the bankruptcy filing is an important determinant of the creditors' plan confirmation decision. Based on our estimates, an increase in leverage in the amount of one standard deviation is associated with a 13.4 percentage point decrease in the prospects of plan confirmation, all else being equal. No other pre-bankruptcy financial indicator or any other observable firm characteristic exerts an effect on creditors' plan confirmation choice. The lack of a statistically significant effect of other financial indicators might at least in part reflect the inherently limited variability of these measures in our sample (all failing businesses tend to exhibit poor financial performance). Yet it is nevertheless noteworthy that, for example, pre-bankruptcy return on assets, which features the largest coefficient of variation among all three key pre-bankruptcy financial indicators, exerts no effect on the creditors' plan confirmation decision.

⁵⁰ See, e.g., Zaheer (1995); Barbosa and Louri (2005); Wright et al. (2005).

Third, among the characteristics of bankruptcy proceedings, the length of proceedings is a statistically significant determinant of plan confirmation. Based on our estimates, a one-standard-deviation increase in the duration of proceedings (4.3 months) is associated with a 9.2 percentage point increase in the likelihood of plan confirmation. This finding suggests that a longer duration of the proceedings does not necessarily lead to the kind of detrimental antagonism between the debtor and the creditors that could result in creditors' rejection of the reorganization proposal. Rather, our results are more consistent with the interpretation that, from the creditors' standpoint, longer proceedings tend to produce comparatively more acceptable proposals. On the other hand, we find no evidence that either the number of creditors or the value of claims—regardless of their type—exert an effect on the creditors' confirmation decision. In particular, our results do not support the conclusion that voting creditors perceive the existence of a large number of creditors or a high value of claims per se as a negative signal of the overall feasibility of proposed reorganization.

Among the multiple groups of fixed effects, none exhibit a statistically significant effect on the prospects of plan confirmation. Finally, we have verified that the lack of statistically significant effects for many of our covariates is not due to potential multicollinearity concerns. Indeed, for the estimated model, the variance inflation factors exceeded the rule-of-thumb threshold of ten only for selected subsets of fixed effects. The overwhelming majority of variance inflation factors for the focal covariates are smaller than five; for the eight indicators of management turnover and ownership change in particular, none exceed the value of 2.34. Moreover, dropping the fixed effects with the highest variance inflation factor from the estimated model does not change any of our qualitative findings and hardly affects any of our point estimates.

5 How Often Do the Creditors Get it Wrong from the Social Efficiency Standpoint?

From the social efficiency perspective, the chief aim of corporate bankruptcy is to facilitate the restructuring of viable businesses and the liquidation of non-viable ones.⁵¹ Whenever this objective is not met, socially costly filtering failures are said to occur.⁵² Intuitively, both the commitment of resources to the reorganization of a non-viable business and the withdrawal of resources from viable, but erroneously liquidated, businesses gives rise to social opportunity costs. How common is the incidence of creditor-induced filtering failures in the context of bankruptcy reorganizations under consideration? To address this question, we first discuss how the incidence of filtering failures can be conceptualized and measured.

⁵¹ See *supra* n. 2.

⁵² See Fisher and Martel (1995, 2004); Cepec and Grajzl (2019).

5.1 Conceptualizing Filtering Failures

Following the literature, we draw an analogy between the creditors' decision to confirm or reject a reorganization proposal and classical statistical hypothesis testing.⁵³ We postulate the null hypothesis that businesses proposing reorganization are not financially viable; given the fact that businesses are able to pursue financial reorganization only upon insolvency, this is a plausible assumption. Then, creditors from the social efficiency standpoint commit a Type I error when they confirm a proposal from a non-viable business (that is, reject the null when the null is true) and a Type II error when they reject a proposal from a viable business (fail to reject the null when the null is false). We say that socially costly filtering failure arises whenever creditors commit a Type I or a Type II error.

Since, in reality, a business putting forth a reorganization proposal is either viable or not viable, there exist four possible outcomes based on the creditors' decision: confirmation of a plan from a non-viable firm (Type I error), confirmation of a plan from a viable firm, rejection of a plan from a non-viable firm, and rejection of a plan from a viable firm (Type II error). Let n denote the total number of observed reorganization proposals, n_{CC} the number of correct confirmations, n_{CR} the number of correct rejections, n_I the number of wrong confirmations (Type I errors), and n_{II} the number of wrong rejections (Type II errors). Let, in addition, n_C denote the number of confirmed plans, n_R the number of rejected plans, n_V the number of viable businesses, and n_N the number of non-viable businesses. The following identities apply:

$$n_C = n_{CC} + n_I \quad (2)$$

$$n_R = n_{CR} + n_{II} \quad (3)$$

$$n_N = n_{CR} + n_I \quad (4)$$

$$n_V = n_{CC} + n_{II} \quad (5)$$

$$n = n_C + n_R = n_N + n_V \quad (6)$$

It then follows that:

$$\text{Prob(Type I error)} = \text{Prob(confirm proposal} \mid \text{non-viable business)} = \frac{n_I/n}{n_N/n} = \frac{n_I}{n_{CR} + n_I} \quad (7)$$

$$\text{Prob(Type II error)} = \text{Prob(reject proposal} \mid \text{viable business)} = \frac{n_{II}/n}{n_V/n} = \frac{n_{II}}{n_{CC} + n_{II}} \quad (8)$$

⁵³ See Fisher and Martel (2004).

With the sum of Type I and Type II errors equal to $n_I + n_{II}$, we can therefore define the relative frequency of Type I and Type II errors combined as:

$$\text{Incidence of filtering failure} = \frac{n_I + n_{II}}{n} \quad (9)$$

5.2 Conceptualizing the Viability of a Business

A key conceptual challenge when attempting to measure filtering failures in bankruptcy reorganization involves the definition of the viability of a business and the corresponding classification of businesses as either viable or non-viable. With the notion of viability depicting the ‘the ability to live’ and ‘ability to continue’,⁵⁴ we define the viability of a business in terms of its survival as a going concern. Operation as a going concern is the quintessential attribute of viability and, at the same time, a characteristic of a business that is directly observable in our data.⁵⁵ Adopting the methodology suggested by Timothy Fisher and Jocelyn Martel, we then use two approaches to ascertaining the viability of a business and, hence, to measuring filtering failures: an ex-post one and an ex-ante one.⁵⁶ Based on the ex-post approach, we classify a business that has completed reorganization proceedings as viable as long as the business is ex post operating as a going concern rather than having entered into liquidation or filed for yet another bankruptcy reorganization (see Sect. 5.3). From the ex-ante perspective, we classify a business as viable if the ex-ante predicted probability of operating as a going concern exceeds a chosen threshold value (see Sect. 5.4).

5.3 Estimating Filtering Failures: Ex-post Approach

If a reorganization proposal is confirmed by the creditors and formally verified by the court, the business begins to execute it. Our data allow us to track the survival of all businesses with confirmed proposals until March 15, 2020. In particular, we observe whether the business is still surviving as a going concern on that date or, alternatively, whether the business has by that date already entered into liquidation or started yet another reorganization.⁵⁷ From the businesses with confirmed reorganization plans that survive as a going concern at the end of our observation window, the mean number of days since plan confirmation over which we track the survival of these businesses is 2230 days, with standard deviation, minimum, and maximum number of days respectively equal to 742.5, 635, and 3,665.

⁵⁴ See Oxford English Dictionary, available at <http://www.oed.com>.

⁵⁵ For an extended discussion of the pros and cons of different conceptualizations of the viability of a business and the associated data-related tradeoffs, see Cepec and Grajzl (2019).

⁵⁶ See Fisher and Martel (2004); Cepec and Grajzl (2019).

⁵⁷ None of the businesses in our data are voluntarily dissolved or, alternatively, merged with or acquired by other businesses.

Therefore, one natural approach toward defining the viability of a business is in terms of observed ex-post survival as a going concern. Specifically, a business is defined as being viable if it survives as a going concern. In our data, from the 127 businesses with confirmed reorganization proposals, 44 businesses survive as a going concern. Thus, 44 of the 127 confirmed plans are from viable businesses. Furthermore, it follows that the creditors made the correct decision to confirm the reorganization proposal in 44 cases and committed a Type I error in the remaining 83 cases, as shown in Table 3.

This definition of viability, however, is not applicable to businesses with rejected proposals. By law, businesses whose proposals do not receive creditors' endorsement are automatically steered into liquidation, a feature of the bankruptcy scheme that leads to an inherent truncation in the data. Thus, for the 75 businesses with rejected proposals in our data, we only know that the corresponding businesses were liquidated: we have no information on whether the respective businesses were actually viable or not. That is, while the number of all rejected proposals (n_R) is known, the number of correctly rejected proposals (n_{CR}) is not and, hence, the number of Type II errors (n_{II}), the total number of non-viable businesses (n_N), and the total number of viable businesses (n_V) are not known either (see Table 3). Moreover, because the probability of Type I errors depends on the number of correctly rejected proposals [n_{CR} ; see expression (7)], we are not able to directly calculate the probability of Type I errors. We can, however, construct a range of possible estimates for the probability of Type I and Type II errors.

To this end, note that, by expression (3) and Table 3, the number of Type II errors (n_{II}) is bounded by 0 and 75. This fact allows us to construct a range of possible estimates for the probability of Type I and Type II errors. From expression (3), $n_{CR}=75-n_{II}$. Applying expressions (7) and (8) then yields:

$$\text{Prob}(\text{Type I error}) = \frac{83}{158 - n_{II}} \quad (10)$$

$$\text{Prob}(\text{Type II error}) = \frac{n_{II}}{44 + n_{II}} \quad (11)$$

Expressions (9)–(11) imply that if $n_{II} = 0$, the probability of a Type I error is 0.525, the probability of a Type II error is 0, and the incidence of filtering failure is 0.411. If $n_{II} = 75$, the probability of a Type I error is 1, the probability of a Type II error is 0.630, and the incidence of filtering failure is 0.782. Under the assumption that each integer value of n_{II} from the interval $[0,75]$ is equally likely, the mean and median incidence of filtering failure equals 0.597.

To estimate the relative prospects of different types of filtering errors, we use (10) and (11) to define the ratio of the probability of a Type II error to the probability of a Type I error:

Table 3 Distribution of reorganization proposals, ex-post conceptualization of business viability

Creditors' decision	Reality		Total
	Business non-viable	Business viable	
Plan confirmed (reject null)	$n_I = 83$	$n_{CC} = 44$	$n_C = 127$
Plan rejected (do not reject null)	$n_{CR} = \text{n.a.}$	$n_{II} = \text{n.a.}$	$n_R = 75$
Total	$n_N = \text{n.a.}$	$n_V = \text{n.a.}$	$n = 202$

The null hypothesis is that businesses filing for financial reorganization are not viable

n_I denotes the number of wrong confirmations (Type I errors), n_{CC} denotes the number of correct confirmations, n_{CR} the number of correct rejections, n_{II} the number of wrong rejections (Type II errors), n_C the total number of confirmed plans, n_R the total number of rejected plans, n_V the number of viable businesses, n_N the number of non-viable businesses, and n the total number of proposed plans. n.a. stands for not available, an outcome due to truncation of the distribution: all businesses with rejected proposals are automatically forced into liquidation. A business is defined to be viable if it is still operating as a going concern on March 15, 2020

$$\text{Error ratio}_{III} = \frac{\text{Prob}(\text{Type II error})}{\text{Prob}(\text{Type I error})} = \frac{n_{II}(158 - n_{II})}{3652 + 83n_{II}} \quad (12)$$

The expression on the right-most side of (12) is a concave function of n_{II} on the interval [0,75]. It attains the maximum value of 0.692 when n_{II} is between 50 and 51. Again assuming that each integer value of n_{II} on the interval [0,75] is equally probable, the median value of the error ratio, defined by (12), is 0.646. Thus, based on ex-post conceptualization of firm viability, Type I errors are on average about 1.5 times as likely to arise as Type II errors.

5.4 Estimating Filtering Failures: Ex-ante Approach

Creditors will want to approve the debtor's reorganization proposal if their expected gain from the debtor's reorganization is greater than their expected gain from the debtor's liquidation. Taking into account the uncertainty over the future prospects of the business, creditors must form expectations about the chances that the business will survive the reorganization.⁵⁸ This ex-ante probability of survival can be empirically estimated and the resulting estimates can be used to classify businesses as viable or non-viable.

Given our focus on survival as the measure of the viability of a business, we define a binary indicator S_i that takes on the value of one if business i with a confirmed proposal is at the end of the observation window observed as surviving as a going concern; and zero if the business has by the end of the observation entered into liquidation or yet another financial reorganization. To model the probability of firm survival we, for the methodological reasons elaborated upon in Sect. 4.1, once again employ a linear probability model. We let the probability of survival equal

⁵⁸ See supra n. 56.

$$p_i \equiv \text{Prob}(S_i = 1|x_i) = \gamma x_i \quad (13)$$

where x_i is the vector of covariates for the business $i \in \{1, \dots, n_A\}$ and γ the vector of coefficients to be estimated.⁵⁹ To predict survival we employ the exact same set of covariates as used in the investigation of the determinants of creditors' voting decision in Sect. 4. Upon carrying out the estimation, we plug the vector of coefficient estimates $\hat{\gamma}$ into (13) to compute the estimated probability of survival for each business $i \in \{1, \dots, n\}$ as $\hat{p}_i \equiv \hat{\gamma} x_i$.⁶⁰

By choosing a threshold probability $\bar{p}$, we can use the estimated probability of survival for each business i to classify the business as ex-ante viable or non-viable. From the ex-ante standpoint and for a given $\bar{p}$ we define business i to be viable if $\hat{p}_i \geq \bar{p}$ and non-viable if $\hat{p}_i < \bar{p}$.

Varying $\bar{p}$ for a given sample size alters the distribution of outcomes based on the ex-ante definition of business viability. Specifically, as the threshold probability $\bar{p}$ increases, the number of proposals from businesses ex ante designated as non-viable [see expression (4)] increases and the number of proposals from businesses ex ante designated as viable [see expression (5)] decreases. Thus, as $\bar{p}$ increases, the scope for Type I errors in general increases and the scope for Type II errors decreases. The probabilities of Type I and Type II errors, however, will in general not be monotonic in $\bar{p}$. The reason is that, for a given subset of observations, the number of Type I and Type II errors (n_I and n_{II} , respectively) need not always change as $\bar{p}$ increases. In particular, for a given sample of reorganization plans, it is possible that as $\bar{p}$ marginally increases, the increase in the number of businesses ex ante designated as non-viable occurs solely because of the increase in the number of correctly rejected proposals (n_{CR}). Then, an increase in $\bar{p}$ results in a decrease in the probability of Type I errors [see expression (7)]. Similarly, following a marginal increase in $\bar{p}$, a decrease in the number of businesses ex ante designated as viable may occur solely due to a decrease in the number of correctly confirmed proposals (n_{CC}). In that case, the probability of Type II errors in fact increases as $\bar{p}$ increases [see expression (8)]. For these reasons, the incidence of filtering failure [expression (9)] in general also need not be non-monotonic in $\bar{p}$.

Table 4 illustrates the above ideas, showing the estimates of the probabilities of Type I and Type II errors; the ratio between the relative prospects of Type II and Type I errors (error ratio); and the incidence of filtering failure for different values of the threshold probability $\bar{p}$. For example, for $\bar{p} = 0.5$, the probability of a Type I error is 0.606, the probability of a Type II error is 0.317, the error ratio is 0.523, and the incidence of filtering failure is 0.520. For this specific choice of threshold probability, the ex-ante estimates of filtering failure are therefore quite similar to the ex-post estimates reported in the previous section.

⁵⁹ None of our key qualitative results change if we instead estimate a logit or a probit upon dropping selected covariates and observations to render the model fully identified.

⁶⁰ The estimates of are not of direct interest in the present analysis and are therefore not presented; full results are available upon request.

Table 4 Estimates of filtering failure, ex-ante conceptualization of business viability

$\bar{p}$	Prob (Type I error)	Prob (Type II error)	Error ratio _{II/I}	Incidence of filtering failure
0.1	0.548	0.336	0.612	0.401
0.2	0.580	0.333	0.575	0.441
0.3	0.593	0.330	0.557	0.470
0.4	0.595	0.321	0.539	0.485
0.5	0.606	0.317	0.523	0.520
0.6	0.604	0.292	0.483	0.530
0.7	0.601	0.256	0.426	0.535
0.8	0.619	0.308	0.497	0.579
0.9	0.628	0.357	0.569	0.609

The table reports estimates of the probabilities of Type I and Type II errors, the error ratio between the probability of Type II and Type I errors, and the incidence of filtering failure based on ex-ante conceptualization of business viability for different values of the threshold probability of business survival $\bar{p}$

Finally, varying the threshold probability $\bar{p}$ also facilitates the estimation of the trade-off between the two types of socially costly filtering errors. Figure 1 illustrates the incidence of Type I errors and Type II errors upon varying the values for the threshold probability $\bar{p}$ from 0.1 to 0.9 in increments of 0.01. Each observation in the figure corresponds to a particular value of $\bar{p}$ and depicts the number of Type I and Type II errors associated with that value of $\bar{p}$. The slope of the included OLS line of best fit is equal to -0.5457 and quantifies the marginal trade-off between Type II errors and Type I errors. According to our estimates, every reduction in the number of Type II errors equal to $\Delta > 0$ on average gives rise to an increase in the number of Type I errors equal to $\Delta/0.5457 \approx 1.83\Delta$. Therefore, any given decrease in the number of rejected reorganization proposals from viable businesses (Type II errors) would at the margin give rise to a little less than twice as large of an increase in the occurrence of confirmed reorganization proposals from non-viable businesses (Type I errors).

5.5 Discussion

Our findings indicate, first and foremost, that the prevalence of creditor-induced socially costly filtering failures in the reorganizations under consideration is quite high. Specifically, our estimates of the incidence of filtering failure range between 41 and 78% based on the ex-post approach, and between 40 and 61% based on the ex-ante approach. To put these estimates in a comparative context, Fisher and Martel's estimates of the incidence of filtering failure in Canadian reorganizations range between 18 and 44% based on the ex-post approach, and between 22 and 55% based on the ex-ante approach.⁶¹ In addition to differences in the nuances of procedure as

⁶¹ See supra n. 53.

Fig. 1 Trade-off between Type I errors and Type II errors based on ex-ante conceptualization of business viability. The figure shows the combinations of the number of Type I errors and the number of Type II errors based on different ex-ante conceptualizations of business viability. Each observation corresponds to a specific value of the threshold probability $\bar{p}$ that ranges from 0.1 to 0.9 in increments of 0.01. The slope of the OLS line of best fit equals -0.5457 .

well as any other unobservable characteristics of the affected businesses and their creditors, at least some of the discrepancy in the estimated prevalence of filtering failure between our estimates and Fisher and Martel's estimates for Canada could be due to differing approaches to assessing the viability of a business. While Fisher and Martel rely on the criterion of plan consummation, we assess the viability of a business based on the comparatively more stringent criterion of survival as a going concern.⁶² In addition, the time-period over which we track the post-reorganization survival of the reorganized businesses for at least some of the businesses overlaps with the financial crisis. These considerations notwithstanding, our estimates still suggest a rather widespread occurrence of filtering failures in the investigated reorganizations.

Second, the creditors are in general more likely to commit Type I errors (confirm reorganization proposals from non-viable businesses) than they are to commit Type II errors (reject reorganization proposals from viable businesses). Much like creditors in Canadian reorganizations, from the social efficiency standpoint, the creditors in the Slovenian reorganizations under consideration most often err on the side of

⁶² Similarly, Cepec and Grajzl (2019) estimate the incidence of filtering failure in the context of the Slovenian simplified bankruptcy reorganization procedure, a recent bankruptcy reorganization scheme intended for small businesses (see Sect. 2), to equal 27%.

confirming reorganization proposals, even if many proposals come from non-viable businesses. This finding is best understood in light of the prospects that creditors in Slovenia face in the event of the liquidation of the bankrupt business. Prior research demonstrates that creditors in Slovenia fail to recover any of their claims in nearly 80% of liquidation cases. Moreover, in the remaining liquidation cases with non-zero payment, the mean total payment to creditors amounts to a slim 6.2% of the mean value of claims.⁶³ Thus, the expected benefit to creditors from rejecting a reorganization proposal is rather low, while confirmation of a reorganization proposal offers at least some possibility for a higher payoff. Consistent with our estimates, the incidence of Type I errors hence tends to be greater than the incidence of Type II errors.

6 Conclusion

We have drawn on detailed data on the unfolding of bankruptcy reorganizations in Slovenia to offer a rare insight into the determinants and the implications of creditors' decisions on the fate of the proposed reorganization plans put forth by bankrupt businesses. Our findings on the determinants of plan confirmation suggest that creditors are inclined to endorse the plans put forth by those businesses that are perceived as promising a credible change in the exercise of control rights. Empirically, such an intention is revealed either via debt-to-equity conversion, which allows the creditors to seize (at least partial) control of the ailing business directly in the course of the reorganization proceedings, or through selected changes in majority ownership that occur within the broader process of reorganization.

In particular, among the different kinds of changes in majority ownership observable in our data, creditors who choose to lend support to the proposed reorganization plans appear to value primarily those that occur during the proceedings and, importantly, feature a new domestic owner. In contrast, majority ownership changes featuring a foreign incoming owner and instances of management turnover exert no effect on the likelihood of creditors' plan confirmation. We similarly find no evidence of an effect on the prospects of plan confirmation of the total number of creditors, the value of different types of claims and, perhaps especially noteworthy, of the contractual nuances of the reorganization plan as they pertain to the repayment of claims. The only remaining statistically significant predictor of creditors' plan confirmation that we uncover are pre-bankruptcy leverage and the duration of proceedings. The prospects of plan confirmation are negatively associated with the former and, notably, are positively associated with the latter.

⁶³ See Cepec et al. (2017).

We then investigated the social efficiency implications of creditors' plan confirmation as measured by the extent to which creditors' decisions, on the one hand, promote the rehabilitation of viable firms and, on the other, facilitate the liquidation of non-viable ones. Conceptualizing the viability of a business with its survival as a going concern, we find that the estimated incidence of filtering failure in Slovenian reorganizations is rather high. Depending on the estimates, it ranges between 41 and 78% or between 40 and 61%. We also establish that creditors confirm plans from non-viable businesses relatively more often than they reject plans from viable businesses.

Our analysis encompasses only those creditor-induced filtering failures that occur at the stage of bankruptcy reorganization. In general, filtering failures in insolvency resolution may also occur earlier, at a point when managers and owners of financially distressed businesses choose between attempting reorganization bankruptcy and pursuing immediate liquidation. At the same time, the relatively high incidence of filtering failure that we discover is, at least to a certain extent, likely a reflection of the fact that a portion of our data encompasses the period of financial crisis when the extent of business failure was inherently disproportionately large.

Future work should examine to what extent our findings extend to those jurisdictions in Europe and beyond where, as in Slovenia, creditors are given a crucial role in the decisions on the fate and mode of restructuring of bankrupt businesses. It would also be relevant to investigate whether, and if so to what degree, different types of creditors (e.g. financial institutions versus suppliers), who tend to differ with respect to both the underlying incentives and the knowledge of the debtors' affairs, perhaps exhibit heterogeneous preferences concerning the destiny of the bankrupt businesses. In addition to incorporating debtor-level information, as utilized in the present paper, such an analysis would require access to creditor-level data.

A well-functioning system of business bankruptcy is essential for the adequate performance of capitalist market economies, a fact we are reminded of especially during financial crises or extraordinary disruptions to commerce such as the most recent one caused by the COVID-19 pandemic. An evidence-based understanding of bankruptcy of the kind we have strived to provide in the present paper is therefore vital to informed policy-making.

Appendix

See Table 5.

Table 5 Variable definitions and description

Variable	Description
Outcomes	
Reorganization plan confirmed	Dummy equal to 1 if creditors confirmed the reorganization plan; and 0 otherwise
Survival as going concern	Dummy equal to 1 if business survived as a going concern by the end of the observation window; and 0 otherwise
Pre-proceedings business characteristics	
Joint-stock company	Dummy equal to 1 if business is a joint-stock company; and 0 if business is a limited liability company
Business age (in years)	Business age (in years) at the start of bankruptcy reorganization proceedings
Foreign owned	Dummy equal to 1 if share of foreign ownership in the business is at least 0.10
Ownership concentration	Herfindahl-Hirschman ownership concentration index
Assets	Total assets (in €) of the business at the start of bankruptcy reorganization proceedings
Leverage	Ratio of liabilities to total assets of the business at the start of bankruptcy reorganization proceedings
Liquidity	Ratio of the difference between total assets and inventories to liabilities of the business at the start of reorganization proceedings
Return on assets	Ratio of net profit to total assets of the business at the start of bankruptcy reorganization proceedings
Proceedings characteristics	
Creditor-initiated proceedings	Dummy equal to 1 if bankruptcy reorganization proceedings were initiated by the creditors; and 0 if by the debtor
Length of proceedings	Length of bankruptcy reorganization proceedings (in months)
Number of creditors	Total number of creditors as established at the start of bankruptcy reorganization proceedings
Ordinary unsecured claims	Total value of ordinary unsecured claims (in €)
Priority unsecured claims	Total value of priority unsecured claims (in €)
Secured claims	Total value of secured claims (in €)
Excluded claims	Total value of excluded claims (in €)
Reorganization plan	
Years for repayment of ord. unsec. creditors	Proposed years of repayment of ordinary unsecured creditors under reorganization plan
Percent repayment of ord. unsec. creditors	Proposed percent of repayment of ordinary unsecured creditors under reorganization plan
Percent repayment of ord. unsec. creditors under liquidation	Estimated percent of repayment of ordinary unsecured creditors in the event of liquidation

Table 5 (continued)

Variable	Description
Percent repayment of ord. unsec. creditors relative to liquidation	Difference between proposed percent of repayment of ordinary unsecured creditors under reorganization plan and estimated percent of repayment of ordinary unsecured creditors in the event of liquidation
Regular restructuring of secured claims	Dummy equal to 1 if secured creditors are affected by the reorganization plan via postponement of payment or altered interest rate; and 0 otherwise
Special restructuring of secured claims	Dummy equal to 1 if secured creditors are affected by the reorganization plan in ways other than postponement of payment or altered interest rate (e.g. via reduction of payment); and 0 otherwise
Debt-to-equity conversion	Dummy equal to 1 if debt-to-equity conversion during bankruptcy reorganization proceedings took place; and 0 otherwise
Management turnover indicators	
Before proceedings, new manager outsider	Dummy equal to 1 if business experienced management turnover within one year prior to start of reorganization proceedings and the incoming manager is an outsider; and 0 otherwise
Before proceedings, new manager insider	Dummy equal to 1 if business experienced management turnover within one year prior to start of reorganization proceedings and the incoming manager is an insider; and 0 otherwise
During proceedings, new manager outsider	Dummy equal to one if business experienced management turnover during reorganization proceedings and the incoming manager is an outsider; and 0 otherwise
During proceedings, new manager insider	Dummy equal to 1 if business experienced management turnover during reorganization proceedings and the incoming manager is an insider; and 0 otherwise
Ownership change indicators	
Before proceedings, new owner foreign	Dummy equal to 1 if business experienced ownership change within one year prior to start of reorganization proceedings and the incoming owner is foreign; and 0 otherwise
Before proceedings, new owner domestic	Dummy equal to 1 if business experienced ownership change within one year prior to start of reorganization proceedings and the incoming owner is domestic; and 0 otherwise
During proceedings, new owner foreign	Dummy equal to 1 if business experienced ownership change during reorganization proceedings and the incoming owner is foreign; and 0 otherwise
During proceedings, new owner domestic	Dummy equal to 1 if business experienced ownership change during reorganization proceedings and the incoming owner is domestic; and 0 otherwise

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