

Characteristics of parties and duration of insolvency cases in Portugal

Manuel Coutinho Pereira
Banco de Portugal

Lara Wemans
Banco de Portugal

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Abstract

Insolvency proceedings play an important role in shaping credit conditions and the allocation of productive resources. The paper focuses on duration analysis of insolvencies judged by Portuguese courts between September 2014 and 2020. The features which contribute to higher duration are the case not being filed by the debtor, a higher number of parties, both creditors and debtors, and the existence of households as creditors. For corporate insolvencies, firm's size, the amount of liabilities and fixed assets, activity in the construction sector and the existence of real collateral guaranteeing debts to the financial sector, also increase duration. (JEL: K40, H11, C41)

1. Introduction

Insolvency is the legal proceeding which aims at satisfying creditors, namely through the recovery of the company or, when that is not possible, through the liquidation of the assets of the insolvent (Insolvency and Corporate Recovery Code - CIRE, article 1). Less than 0.5% of companies and households in Portugal are subject to an insolvency request each year.¹ However, the effectiveness of these proceedings has an impact that goes much beyond those that face insolvency.

Firstly, this proceeding has a direct impact on a wide set of economic agents which includes the creditors of the insolvent and, in the case of companies, also their suppliers, clients and workers (Titman 1984). For the workers in firms that become insolvent, wage losses can be relevant and long-lasting (Graham *et al.* 2019).

Secondly, differences between legal jurisdictions regarding creditor protection, amounts recovered and costs have an effect on credit contractual conditions (Roberts and Sufi 2009). For companies, Davyddenko and Franks (2008) state that insolvency practices in the United Kingdom, France and Germany have very different durations

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E-mail: manuel.coutinho.pereira@bportugal.pt; lara.wemans@bportugal.pt

1. CEPEJ data indicates that the number of insolvencies per inhabitant in Portugal is close to the euro area average.

and recovery rates and that banks demand more collateral when legal provisions are less favourable to the creditor. Recent studies found evidence of an impact of insolvency effectiveness on credit access conditions for riskier companies (Rodano 2021) and on investment (Ponticelli and Alencar 2020), even among legal jurisdictions within the same country. Regarding households' insolvency, Albanesi and Nosal (2015) conclude that these costs have an impact on the decision to file a case and Antunes *et al.* (2019) argue that a change in these costs can have relevant macroeconomic effects on consumption.

Finally, there is evidence that corporate performance deteriorates much before liquidation (Almus 2004). Insolvency rules, as they have an effect on the timing companies exit the market, will also play an important role in resource reallocation. Osterhold and Gouveia (2020) study the survival of low productive companies in Portugal and conclude that a more efficient exit mechanism promotes the restructuring of viable firms.

McGowan and Andrews (2018) construct an indicator based on responses to a questionnaire on insolvency policies. The results for Portugal, referring to 2016, point to an intermediate position regarding the features of insolvency legislation promoting economic growth. Nevertheless, as studies from Rodano (2021) and Ponticelli and Alencar (2020) indicate, legislation is only one of the relevant features for the efficiency of this procedure as implementation can lead to significant differences, namely regarding duration.

Households' insolvency has grown in Portugal in the last decade, with the increase in cases filed during the financial crisis being only partially reverted in recent years. Nowadays, private debtors represent three in every four insolvency cases. A more efficient insolvency proceeding for households may contribute to a reduction in the costs of credit, especially for those with higher default risk, and to a swifter recovery of over-indebted households. Results point to a reduction of duration of these cases in the last years, though a quarter of them still takes at least 14 days up to the declaration of insolvency and six months up to closure.

Corporate insolvencies also increased significantly with the financial crisis, but returned to pre-crisis levels in 2016. Duration also registered a downward trend, but these cases are usually lengthy, with the 75th percentile for duration currently at two months up to insolvency declaration, and three and a half years until case closure.

This article analyses the duration of insolvency cases pending in Portuguese courts in September 2014 and those filed from there onwards up to the end of 2020, excluding cases concerning public and financial sector companies, not covered by CIRE. In fact, duration is, together with administrative costs, one of the most important characteristics of these procedures. Studies such as Morrison (2007) point to the existence of a strong relation between duration and administrative costs for the parties involved. Moreover, indirect costs from corporate insolvency should also increase with duration, through the retention of assets which could have been more swiftly reallocated (Bricongne *et al.* 2016).

Amongst the characteristics that delay both the declaration of insolvency and case closure, the following are noteworthy: case requested by the creditors (as opposed to being presented by the insolvent); number of parties and the participation of private

creditors. As regards corporate insolvency, several other characteristics delay case closure, such as the size of liabilities and fixed assets, the existence of real collateral guaranteeing debts to the financial sector and activity in the construction sector.

There are several studies focusing on duration analysis of corporate insolvency and reorganization.² Bris *et al.* (2006) find evidence of a relevant «judge effect» on insolvencies and reorganizations in the US and conclude that these procedures have a similar duration, but reorganizations yield higher recovery rates, especially to unsecured creditors. A higher number of creditors increases duration. Morrison (2007) focuses on restructuring in the US, estimating a competing risk model which studies duration to closure (frequently through insolvency) or restructuring. It concludes that uncertainty regarding the value of the company, proportion of cash holdings and leverage reduce case duration. Lastly, Kwon and Hahn (2010) apply a similar model to reorganizations of listed companies in South Korea and conclude that firm size increases duration.

This literature uses samples of, at most, some hundred cases, which compromises the precision of econometric estimates, but has the benefit of considering very exhaustive information about case characteristics. The innovation of this article lies on the focus on Portugal and on a very comprehensive fraction of all private and corporate insolvencies in the last years (around 85%), including around 100 thousand observations, which allows for a higher reliability of the estimates of insolvency duration. However, the database used does not include information on the debtor, when it is a household, and has few details on procedural aspects and on the way the insolvency ended.

This article is organized as follows. Section 2 briefly describes insolvency proceeding in Portugal. Section 3 presents the main characteristics of insolvencies, including the evolution cases filed and duration in the recent past. Section 4 presents the methodology and the main variables. Sections 5 and 6 discuss the determinants of duration to case closure and to insolvency declaration, respectively. Section 7 concludes.

2. Insolvency procedure in Portugal

Under Portuguese law, an entity is insolvent if it cannot fulfil overdue obligations or, in the case of a corporation, if it has liabilities clearly above its assets (CIRE, article 3). The case is filed in the jurisdictional unit (*comarca*) of residence or where the firm develops its main economic activity. Cases are judged in specialized courts (*tribunais de comércio*) whenever they exist.³

Figure 1 presents the main milestones of these proceedings, which start with a request made by the insolvent or by its creditors. When made by the creditors, debtors need to be notified, and can oppose. The second relevant milestone is the insolvency declaration. It implies the attachment of seizable assets and the suspension of enforcement and seizures

2. Under the US legal system, Chapter 7 is the procedure comparable to insolvencies in Portugal, while Chapter 11 reorganizations are dealt under *Processo Especial de Revitalização* which will not be analysed in this article.

3. Currently only 6 from 23 jurisdictional units do not have specialized courts.

on the debtor. Afterwards, an initial meeting of creditors may occur (this became optional in 2012). In this meeting, creditors appreciate the report from the insolvency practitioner. They also take a stand, in the case of companies, for the liquidation or the continuation of the firm and, in the case of households, for the discharge of debts or the approval of a payments plan (upon debtor's proposal). Votes at creditor meetings are set according to the proportion of credits.

Finally, case closure takes place, for companies, at the beginning of the application of the insolvency plan or the proportional distribution to the creditors of the proceeds from the sale. The insolvency plan must be approved by a two-thirds majority and certified by the judge. It may foresee firm's restructuring or liquidation, even under different conditions than set out by CIRE, as long as creditors are treated equally. The sale of the company can occur as a going concern, ensuring business continuation, or in parts, leading to liquidation.

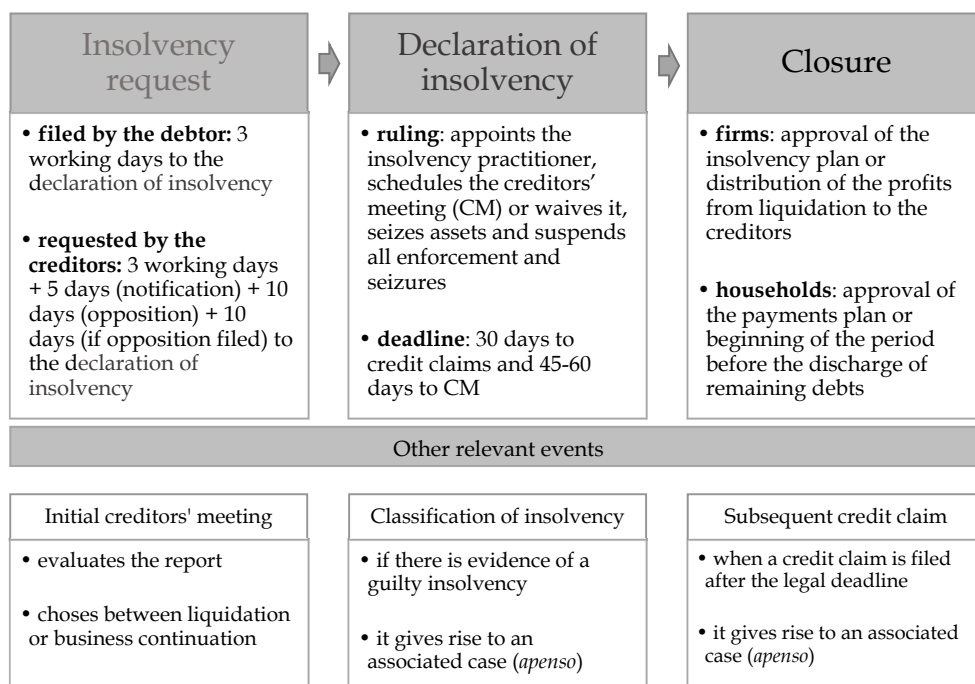


FIGURE 1: Milestones of the insolvency procedure - simplified presentation

For households, case closure can also take place for two reasons: i) the beginning of the payments plan, supported by a majority of two thirds at the creditors meeting and approved by the judge, involving debt restructuring and enabling the debtor to keep seizable assets or ii) the beginning of a period until the discharge of the remaining debts. In this latter option, creditors receive, in addition to the proceeds from the sale of seizable assets, the income of the insolvent above a certain minimum subsistence threshold during 5 years. After this period, the remainder debts are cancelled, with the exception of tax and contributory debts. Some assets are not seizable, such as goods vital to the household economy or of a reduced economic value, goods in co-ownership and a bank account balance up to the minimum wage.

Several procedural aspects (*apensos*) can be filed under insolvency cases, the most relevant being: i) classification of insolvency, which became non-mandatory in 2012 and evaluates whether there were acts which led to a deterioration of debtors' assets and also acts entailing simultaneously personal benefits to the insolvent or a third party; ii) subsequent credit claim, when a creditor seeks the recognition of debts after the initial deadline to do so (usually 30 days after the declaration of insolvency). These procedural aspects do not prevent case closure.

Except for such procedural aspects, judge's intervention is scarce, being focused on the insolvency declaration, the endorsement of the insolvency or payments plan and credit recognition and ranking. The insolvency practitioner has a central role in managing the case (Bernstein 2017). The compensation of insolvency practitioners includes a fixed component and a variable component related to the amount and proportion of recovered credits in the insolvency plan or asset sales. If the insolvency practitioners have to manage a company day-to-day business, they are also paid for that.

Since the approval of CIRE, in 2004, the most significant changes occurred in 2012, in the context of the Economic and Financial Assistance Programme (European Commission - DG-ECFIN 2014), and in 2017, with the creation of special procedures, respectively, for the recovery of firms (*Processo Especial de Revitalização*) and households (*Processo Especial para Acordo de Pagamento*). These procedures will not be analysed in this article. In 2012, insolvency was simplified through the resource to electronic communication and publication of procedural acts and the shortening of some legal deadlines. An example was the reduction of the deadline for holding the creditors' meeting from 75 to 60 days. In 2017, the use of electronic means was broadened, while the possibility of creditors to choose the insolvency practitioner was restricted to complex cases (Rodrigues *et al.* 2017 and Abreu Advogados 2017). In 2021, a ministerial order was passed regulating the direct electronic access of insolvency practitioners to the databases of tax administration, social security and commercial, vehicles and property register, with full implementation expected in February 2022. This access may reduce insolvency duration, similarly to what happened to enforcement cases (Pereira and Wemans 2018).

3. Insolvency description

3.1. General characteristics

The main dataset used was extracted from information published online⁴ that allows the identification of the date, type and jurisdictional unit of the judicial acts in insolvency cases taken between September 2014 and December 2020⁵. This database also includes

4. www.citius.mj.pt/portal/consultas/ConsultasCire.aspx.

5. Including only cases with acts up to 31 December 2020 may lead to some underestimation of the number of cases entering in 2020, as cases may be registered with some delay.

several characteristics of insolvencies, such as the date of the request, debtors, creditors and those filing the request. The system for exchange of reference information (*Sistema de Partilha de Informação de Referência* - SPAI) was used to identify the sector of activity of creditors and both the Central Balance Sheet Database (*Central de Balanços* - CB) and the Central Credit Register (*Central de Responsabilidades de Crédito* - CRC) to obtain some characteristics of the debtors if they were corporations.⁶ Cases with errors in the identification of relevant dates were discarded as well as 105 cases (0.1% of the sample) which started before September 2004, when CIRE came into force.

Private insolvency cases are almost always requested by the sole insolvent and are dealt with in specialized courts (both 90%). On average, there are 5.2 creditors, 2.1 financial institutions, 0.9 non-financial corporations, 0.3 public - mainly tax authority and social security - and 0.2 households.⁷ There are still, on average, 1.7 unidentified creditors. Around a quarter of cases has more than one debtor (Table A1 in appendix).

The vast majority of corporate insolvency cases are also dealt with in specialized courts (92%), but the percentage of cases filed by the debtor is much lower (50%) and such cases include, on average, a higher number of creditors (18, of which 5.8 unidentified). Among the identified creditors, on average 7 are non-financial corporations, for instance suppliers and 3.5 are households, which may be workers. Besides those, there is an average of 1.3 financial corporations and 0.7 public sector creditors. Only a very small fraction of cases has more than one debtor (0.5%).

Regarding the cases successfully matched with CB and CRC, 76% are micro firms, in 10% the public sector holds the majority of the debts and in 34% the firm is not active in the year of the insolvency request.⁸ Taking into account CRC information, 22% have loans with real collateral, 10% with financial collateral and 50% with other collateral types, such as personal guarantees. Compared to all companies covered by CB, those facing insolvency are on average larger, both in number of workers and in total liabilities. Regarding economic sectors, companies which requested insolvency are concentrated in the trade, food and accommodation (37%), manufacturing (22%) and construction (16%) sectors.⁹

Figure 2A depicts the evolution of cases filed and resolved, which have a very similar behaviour, as the duration up to insolvency declaration is, in general, very short. Official statistics only provide the split between private and corporate insolvencies for resolved cases, shown in Figure 2B but for the abovementioned reasons, this would be similar to that of filed cases. The number of insolvency requests in Portugal grew significantly

6. Data is matched in the closer year to the insolvency request going back at most 4 years. For simplification, January information from CRC was considered. There was no available information from CB or CRC for 2020 yet and information from CSI starts in 2006. For confidentiality reasons, it is not possible to match the data for households in CRC.

7. Financial sector corresponds on the Portuguese Classification of Economic Activities (CAE) to sector K and public sector to CAE O.

8. Besides firms classified under suspension or ceasure of activity in CB, we also considered as inactive firms those that did not file the CB in the year of the insolvency request nor in the two previous years.

9. Trade, food and accommodation corresponds to CAE G and I, manufacturing to CAE C, D and E and construction to CAE F.

during the financial crisis. A downward trend started in 2014 that led to the return to pre-crisis levels in the case of firms, while for households the recovery was incomplete. The year of the outbreak of the pandemic crisis saw a sharp reduction in private insolvencies that may be related to supply bottlenecks, taking into account the restrictions to the operation of services, and also to demand issues, in a context of reduced mobility, proliferation of credit under moratorium and the suspension of tax and contributory enforcement actions. Figures 2A and 2B also show that the database constructed from information published on CITIUS covers an important fraction of all insolvency cases (around 85%).

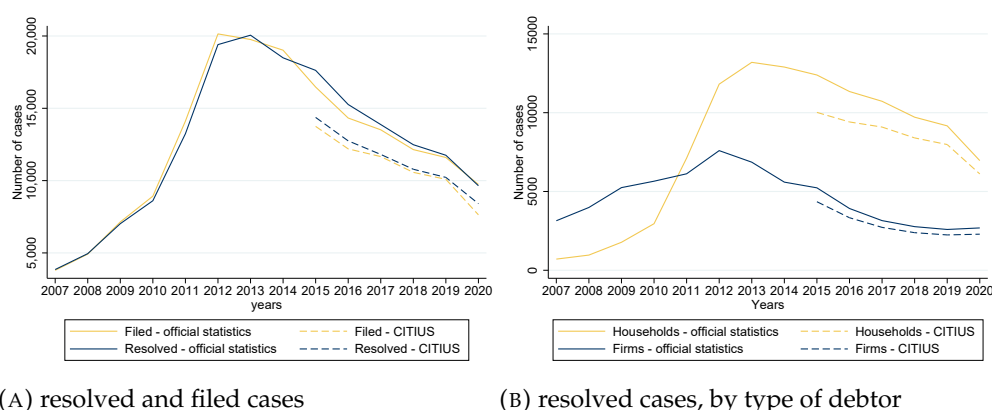


FIGURE 2: Evolution of the number of insolvencies in Portugal

Sources: DGPI and CITIUS (authors' calculations).

Note: Official data exclude transferred cases. Data collected from CITIUS may underestimate filed cases in 2020 (see section 3).

3.2. Duration

The duration of insolvency cases can be analysed according to two approaches. The first, used in official statistics, classifies a case as resolved when insolvency is declared or when the insolvency request is denied. This article considers as duration up to insolvency declaration the time span between the case being filed and one of these two events. For simplicity, taking into account that only around 0.5% of requests in our database are denied¹⁰, the term duration until declaration also covers such cases. The second approach, perhaps of higher economic interest, is centred on the duration between the insolvency request and case closure, identified by the closing date, the publication of the initial decision of the discharge of the remaining liabilities or the approval of a payments or insolvency plan.

As discussed in Pereira and Wemans (2018), duration of resolved cases is not the most informative measure of case duration in a given year, as many cases resolved in that year have entered the system in previous years. Therefore, this indicator may

10. If there would be a tendency by judges to do not register procedural acts in CITIUS when insolvencies get denied, this percentage would not be representative of the universe of insolvencies.

increase (decrease) if there is a focus on the resolution of older (more recent) cases. As an alternative, duration analysis considering all cases that went through the system year-by-year allows for the estimation of the time until 25%, 50% and 75% of cases being resolved (Figures 3A to 3D).

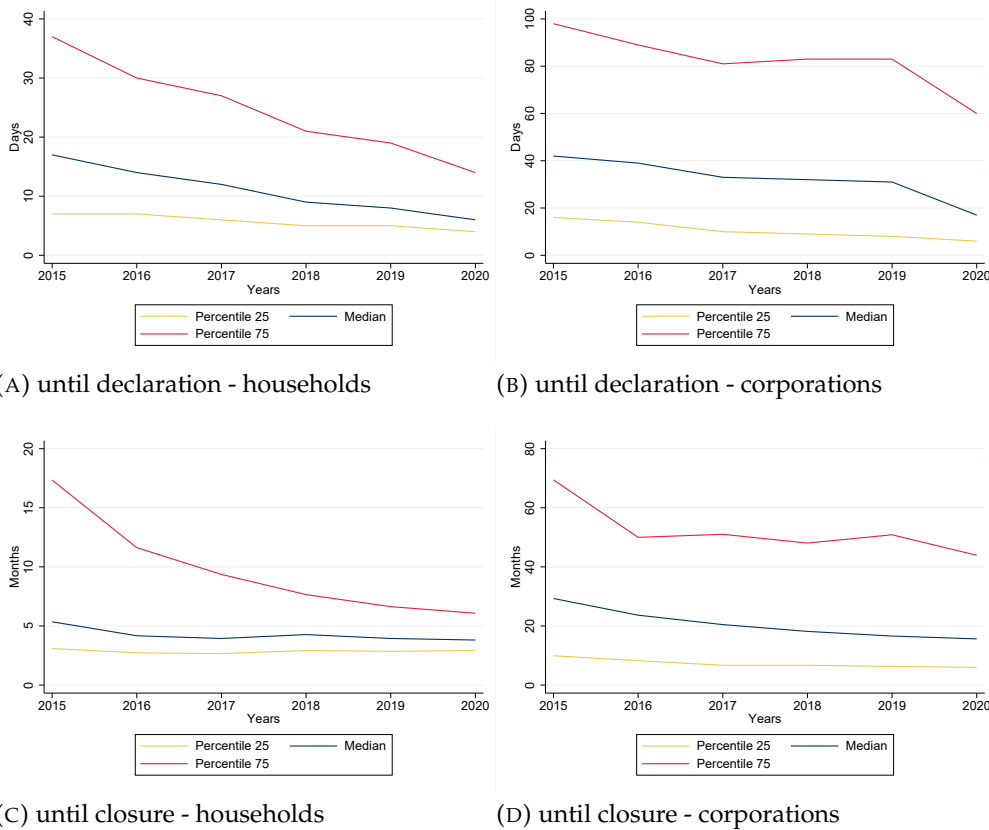


FIGURE 3: Duration of insolvencies in Portugal between 2015 and 2020

Note: Percentiles from survival functions, estimated with complete information on the insolvencies that went through the system each year.

Between 2015 and 2020, the estimates of the time span until insolvency is declared for half of the cases declined, in the case of households, from 17 to 6 days and, for corporations, from 40 to 17 days. Regarding duration until case closure, the median for households has stabilized around 4 months (in contrast with the 75th percentile that posted a significant reduction). In the case of corporations, case length was reduced from 29 to 16 months. This evolution may be associated to improving economic activity and to the increase in the use of swifter instruments to identify and sell assets by insolvent practitioners.

The survival function indicates the estimated probability of cases to remain open (on the y-axis) as a function of time since the request was filed (on the x-axis). As regards duration until insolvency declaration, whether the requests is made by the debtor or by creditors should be an important determinant of duration. This because, as posted in Figure 1, in the first case the law establishes a deadline of 3 working days for the issuance of the declaration of insolvency, while in the second case this period is increased

by up to 25 days. Figures 4A and 4B confirm a much higher duration for cases requested by creditors. In fact, the median duration until the issuance of the declaration in cases presented by the insolvent is 10 days, higher than established by law but still much lower than the 90 days for the rest of the cases.

Regarding duration until case closure, only cases presented by the debtor when this is a household are clearly swifter than the rest. The reasons for household insolvency to be quicker should be linked to its lower complexity, while the difference between cases filed by the debtor and by others may be associated with the cooperation of the insolvent in the case, which may be more important as regards private insolvencies.

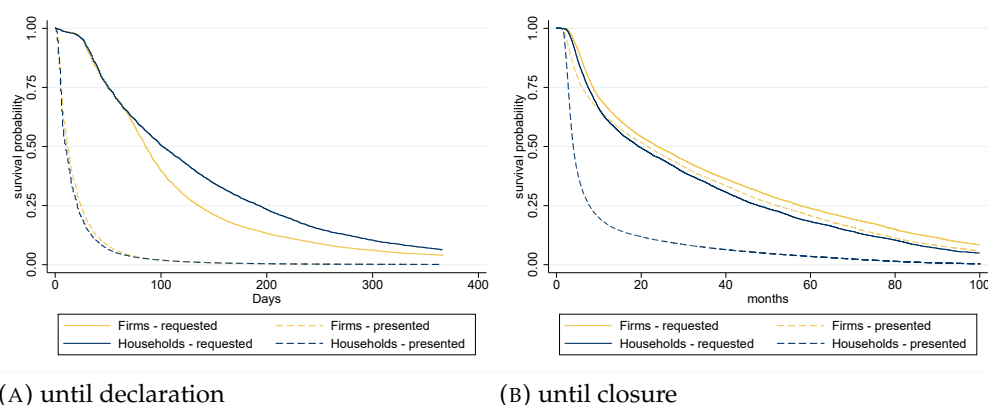


FIGURE 4: Survival functions by insolvent and according to presentation by the debtor or requested by the creditors

Note: Figures depict Kaplan-Meier survival functions until the 99th percentile of duration for the complete sample.

Furthermore, there is a significant variability in duration among different jurisdictional units, without a clear connection with size. For instance, median duration until closure in the quickest jurisdictional unit is of 3 months for households and 8 months for firms, which compares to 14 and 57 months, respectively, in the slowest one. This may be associated to differences in the efficiency of the proceeding or in average case complexity among jurisdictional units. It is important to consider that the majority of the insolvency practitioners works in a significant number of jurisdictional units, which makes significant efficiency variability less likely.

3.3. Time profile of insolvency declaration and case closure

Along with the survival functions, the distribution of duration can be studied taking into account hazard functions, which measure the instantaneous rate of case resolution, reported to a given moment after case start, conditioning to the case being still pending.

Figures 5A and 5B depict these functions, respectively, for households and firms until insolvency declaration. They post an increasing resolution rate up to a maximum that is reached more rapidly for households than for firms. Figure 5C posts the same function but for the duration to case closure of private insolvencies indicating that the rate of resolution of pending cases is higher in an initial phase, declining up to a duration

of 25 months and remaining more less constant after that. In the case of corporate insolvencies, the hazard function for the duration to case closure (Figure 5D) has, after an initial increasing phase, a U shape - decreasing and subsequently slightly increasing.

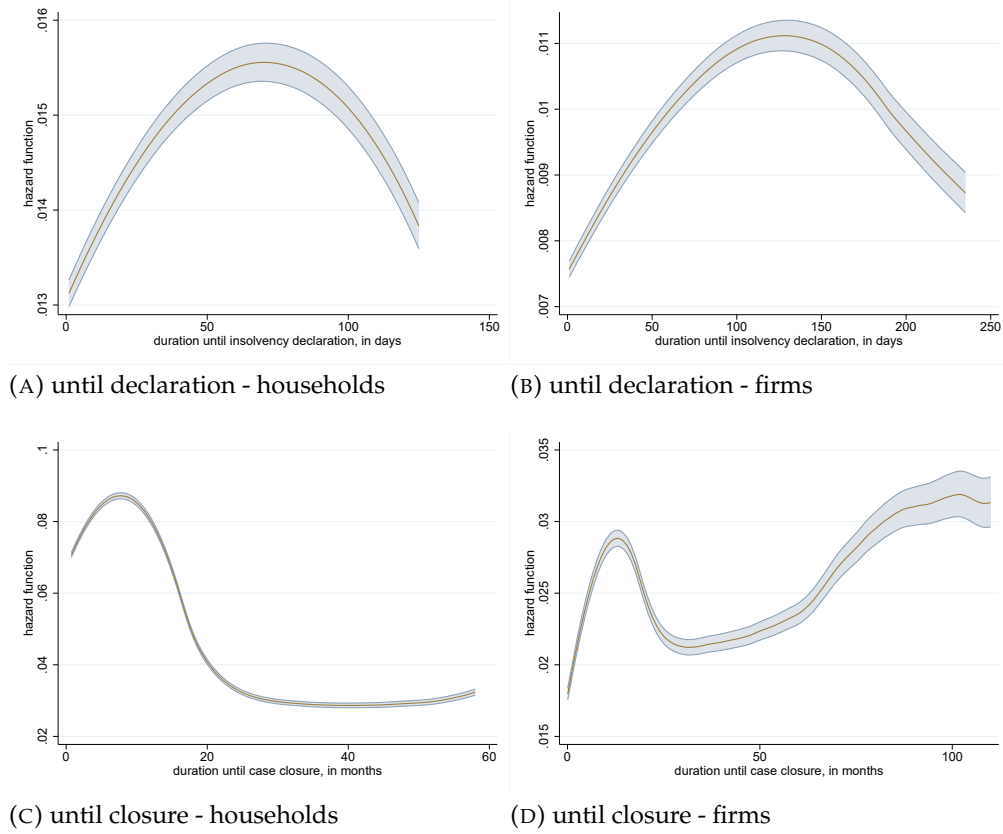


FIGURE 5: Hazard functions by type of insolvent

Note: Figures depict hazard functions for durations up to the 95th percentile.

4. Econometric methodology and explanatory variables

The impact of explanatory variables on duration is studied by using the Cox (1972) model, which assumes that each regressor shifts the baseline hazard function in a multiplicative way, i.e. there is proportionality of hazards. Thus, the hazard function of an insolvency case associated with the explanatory variables $\mathbf{x}_i$, $h(t|\mathbf{x}_i)$, is given by $h(t|\mathbf{x}_i) = h_0(t) \exp(\mathbf{x}_i\beta)$, where $h_0(t)$ is the baseline hazard function and $\exp(\mathbf{x}_i\beta)$ the relative hazard. There is a proportionality relationship between the hazard functions of any two cases (associated with $\mathbf{x}_j$ and $\mathbf{x}_i$), given by $\exp(\mathbf{x}_j\beta) / \exp(\mathbf{x}_i\beta)$. The Cox model has a semiparametric nature, as it does not require the formalization of the baseline hazard function.

The proportionality assumption can be tested for the regression as a whole and for specific regressors. It can also be dropped for one or more categorical variables through a stratified estimation procedure, assuming that the baseline hazard functions

are differentiated within strata defined by the values of these variables, while the coefficients of the remaining explanatory variables are common to all strata. It is also possible to estimate differentiated impacts of regressors by segments of overall duration, thus restricting the proportionality assumption to such segments. Both procedures have been used in this article, as explained below. Furthermore, parametric models have been estimated in a robustness section, which require the specification of the distribution associated with the duration model, without imposing proportional hazards.

The explanatory variables in the econometric analysis of duration to closure capture some general features of cases, common to private and corporate insolvencies. For the latter insolvencies, a set of variables concerning firms' activity and financing has been added (see Section 3.1 for more details on the data).

Variables relating to the case comprise (i) whether the case has been filed by the insolvent or by creditors, (ii) number of debtors, in the case of private insolvencies, (iii) number of creditors and (iv) type of creditors involved (financial, public administration, business and private). The variables specific to corporate insolvencies include (i) sector of activity, (ii) existence of real, financial or other collateral, guaranteeing debts to the financial sector (iii) a size indicator, (iv) value of fixed assets, (v) value of liabilities, (vi) if the majority of liabilities are with the public administration and (vii) if the company is no longer active in the year of the insolvency request. The value of fixed assets approximates the size of assets that generally will have to be liquidated in the course of the proceedings. The value of liabilities captures the amount of claims to be satisfied, complementing information on the number and type of creditors. Fixed assets and liabilities were taken in logarithms. Cessation of activity measures the extent to which firm's situation has deteriorated at the start of the insolvency case.

The economic cycle may also have an influence on case duration, namely through the volume of incoming cases and the pace of liquidation of the insolvent's assets. Thus, an economic activity indicator over the lifetime of the case has been derived as the average variation of the coincident indicator of Banco de Portugal (with monthly frequency). Ideally, the regression should also include variables capturing procedural events giving rise to *apensos* (see Section 2), in a specification allowing time-variation of such variables. However, it has not been possible to identify such events for all cases in the database. Nevertheless, these *apensos* do not prevent the closure of insolvencies and should have a less significant impact on duration than in other types of cases, such as enforcement ones. The variables referring to the type of creditor have an important number of missing observations, which were imputed through a multiple imputation procedure.¹¹

In the Cox models estimated in this article, the jurisdictional unit where the insolvency case has been dealt with has been used to stratify the sample, in order to control for factors specific to that unit not captured by the regressors considered, for example, the degree of congestion or the average complexity of insolvency proceedings.

11. This procedure is based on «chained» logistic regressions in which the regressors include the other variables to be imputed, the other regressors in the main regression and, as additional information, the proportion of credits belonging to the financial sector and the public sector, as well as the failure indicator and the baseline cumulative hazard (White and Royston 2009).

Note that this is preferable to the inclusion of fixed effects, which assumes the proportionality of the hazard functions across all jurisdictional units, an assumption that has been tested and is violated in the data. Even after stratification by jurisdictional unit, the proportionality assumption does not hold for some regressors for which it is important to assess impacts on duration. However, such an assessment would not be possible if these regressors were modelled as additional stratification variables. Thus, a complementary specification was estimated, with variable coefficients along three segments of case duration.¹² This specification is more flexible, as proportionality of risks is imposed within each segment only.

Duration to case closure is the one of greatest economic interest. However, duration to the insolvency declaration by the judge, the first stage of the case, has been studied as well. In this second analysis, only the case-related explanatory variables have been considered.

5. Duration to closure of insolvency proceedings

Tables 1 and 2 present the results of the estimation of a Cox model for private and corporate insolvencies, respectively, both assuming proportional hazards for the whole duration and restricting it to segments of duration. Estimation results (shown as the exponentials of coefficients) indicate the shift in the baseline hazard function stemming from the change in regressors, i.e. the impact on the (probabilistic) rate of resolution of pending cases. Therefore, when the exponential of a coefficient is equal to 1, the regressor has no impact on the resolution rate. If the exponential is lower than 1, say 0.9, such rate is reduced by 10%, extending duration. If the exponential is higher than 1, say 1.1, the rate is increased by 10%, shortening duration.

5.1. Determinants of duration relating to the case

The filing of the insolvency case by the insolvent (rather than by a creditor) shortens duration strongly, especially in the first duration tertile, and in private insolvencies. This is due, from the outset, to the absence of the need to notify the debtor at the beginning of the proceedings, as well as of a possible opposition to insolvency. Furthermore, the cooperation of the insolvents in the identification of the assets and, more generally, the fact that they consider the case to be in their own interest tend to shorten duration.

Private insolvencies involving more than one debtor tend to proceed more slowly; coefficients by duration segments are always significant for this regressor, but they are close to each other. The involvement of a larger number of creditors tends to prolong the duration of insolvencies, both when the debtors are individuals and firms, which may be attributable to a greater difficulty in reconciling the interests of the parties, for example, at creditors' meetings. For private insolvencies, the estimated coefficients by

12. The segments were calculated according to the 33rd and 66th percentiles of the survival functions, separately for private insolvencies (3rd and 7th months) and corporate insolvencies (11th and 41st months).

	Proportionality full duration	Proportionality by duration segments		
		up to 3 months	3 to 7 months	over 7 months
Requested by debtor (creditor)	2.53*** <i>0.04</i>	15.54*** <i>1.40</i>	4.38*** <i>0.14</i>	1.64*** <i>0.03</i>
Several debtors	0.89*** <i>0.01</i>	0.88*** <i>0.02</i>	0.88*** <i>0.02</i>	0.91*** <i>0.01</i>
<i>Number of creditors (less than 4)</i>				
4 or 5 creditors	0.89*** <i>0.01</i>	0.91*** <i>0.02</i>	0.90*** <i>0.02</i>	0.91*** <i>0.02</i>
over 6 credores	0.81*** <i>0.01</i>	0.85*** <i>0.02</i>	0.80*** <i>0.02</i>	0.84*** <i>0.02</i>
<i>Type of creditor</i>				
Financial	1.07*** <i>0.02</i>	1.09** <i>0.05</i>	1.03 <i>0.03</i>	1.08** <i>0.04</i>
Public administration	1.08*** <i>0.01</i>	1.04* <i>0.02</i>	1.06*** <i>0.02</i>	1.11*** <i>0.02</i>
Business	1.07*** <i>0.01</i>	1.02 <i>0.02</i>	1.06*** <i>0.02</i>	1.09*** <i>0.02</i>
Private	0.89*** <i>0.01</i>	0.88*** <i>0.02</i>	0.86*** <i>0.02</i>	0.90*** <i>0.02</i>
Economic activity (non-interacted)	1.03*** <i>0.00</i>		1.03*** <i>0.00</i>	
N° observations	71,800		71,800	

TABLE 1. Determinants of duration to closure, private insolvencies

Notes: Table shows exponentials of coefficients, i.e. hazard ratios, estimated by the Cox regression, stratifying by jurisdictional unit; omitted groups in parenthesis; standard-errors (in italics) adjusted to account for the variability stemming from the multiple imputation of the creditor type variables; p-values: * <0.1; ** <0.05; *** <0.01.

duration tertiles are again significant and quite close to each other, while for firms there is only statistical significance for the short to the intermediate durations.

The presence of public administration creditors accelerates the course of insolvencies, particularly when the debtors are firms. This effect is attributable to two factors. On the one hand, debts to the State (mostly to tax authorities and social security) have a very standardized nature, similar across insolvencies, which facilitates the tasks of the creditor and the insolvency practitioner. Furthermore, given the privileged status of the State vis-à-vis some of the other creditors, it is possible that the debts to the State may, in some cases, absorb the entire insolvency assets, simplifying the proceedings. The binary variable that captures the cases in which the public sector is the majority creditor (in the case of corporate insolvencies) indicates an additional acceleration effect. This can be explained by the ease of position alignment among public creditors at creditors' meetings, where some important decisions are made by majority.

In private insolvencies, there is also a speeding-up effect when financial and business creditors are present. In fact, financial institutions and larger firms will be in a position to carry out a professional follow-up of insolvencies, and their presence may, in this way, speed up the proceedings. However, such an effect is almost absent in corporate insolvencies. This may reflect the fact that the variable is also capturing other characteristics of cases (not included in the model) associated with financial and business creditors, which give rise to an increased duration. Insolvency proceedings that

	Proportionality full duration	Proportionality by duration segments		
		up to 11 months	11 to 41 months	over 41 months
Requested by debtor (creditor)	1.16*** <i>0.02</i>	1.50*** <i>0.04</i>	1.03 <i>0.03</i>	1.11*** <i>0.03</i>
<i>Number of creditors (less than 6)</i>				
6 to 13 creditors	0.94* <i>0.03</i>	0.85*** <i>0.04</i>	0.94 <i>0.05</i>	1.08 <i>0.06</i>
over 13 creditors	0.76*** <i>0.03</i>	0.57*** <i>0.04</i>	0.72*** <i>0.04</i>	0.93 <i>0.06</i>
<i>Type of creditor</i>				
Financial	0.96 <i>0.03</i>	0.91** <i>0.04</i>	1.02 <i>0.05</i>	0.99 <i>0.05</i>
Public administration	1.40*** <i>0.05</i>	1.29*** <i>0.07</i>	1.36*** <i>0.06</i>	1.43*** <i>0.07</i>
Business	1.06 <i>0.04</i>	0.95 <i>0.05</i>	1.11* <i>0.07</i>	1.24*** <i>0.10</i>
Private	0.94* <i>0.03</i>	0.83*** <i>0.04</i>	0.95 <i>0.04</i>	1.03 <i>0.05</i>
Public creditors in majority	1.11*** <i>0.03</i>	1.10** <i>0.05</i>	1.22*** <i>0.05</i>	1.06 <i>0.05</i>
Cessation of activity	1.10*** <i>0.02</i>	1.12*** <i>0.03</i>	1.13*** <i>0.03</i>	1.05* <i>0.03</i>
Liabilities	0.95*** <i>0.00</i>	0.95*** <i>0.01</i>	0.94*** <i>0.01</i>	0.94*** <i>0.01</i>
Fixed assets	0.97*** <i>0.00</i>	0.96*** <i>0.00</i>	0.98*** <i>0.00</i>	0.99*** <i>0.00</i>
Microenterprise	1.11*** <i>0.02</i>	1.16*** <i>0.06</i>	1.11*** <i>0.04</i>	1.16*** <i>0.04</i>
<i>Type of collateral</i>				
Real collateral	0.79*** <i>0.02</i>	0.76*** <i>0.04</i>	0.71*** <i>0.03</i>	0.83*** <i>0.03</i>
Financial collateral	0.95* <i>0.03</i>	1.08 <i>0.07</i>	0.88*** <i>0.04</i>	0.91** <i>0.03</i>
Other collateral	1.08*** <i>0.02</i>	0.97 <i>0.03</i>	1.00 <i>0.03</i>	1.26*** <i>0.04</i>
<i>Debtor's activ. sector (manuf. ind.)</i>				
Agriculture and mining	0.98 <i>0.07</i>	1.12 <i>0.13</i>	0.81* <i>0.10</i>	1.04 <i>0.12</i>
Construction	0.78*** <i>0.02</i>	0.75*** <i>0.04</i>	0.71*** <i>0.03</i>	0.85*** <i>0.03</i>
Trade, food and accommodation	1.05** <i>0.02</i>	1.04 <i>0.04</i>	1.05 <i>0.04</i>	1.02 <i>0.03</i>
Other services	0.98 <i>0.02</i>	1.00 <i>0.05</i>	0.90*** <i>0.04</i>	1.01 <i>0.04</i>
Economic activity (non-interacted)	1.23*** <i>0.01</i>		1.22*** <i>0.01</i>	
N° observations	24,542		24,542	

TABLE 2. Determinants of duration to closure, corporate insolvencies

Notes: Table shows exponentials of coefficients, i.e. hazard ratios, estimated by the Cox regression, stratifying by jurisdictional unit; omitted groups in parenthesis; standard-errors (in italics) adjusted to account for the variability stemming from the multiple imputation of the creditor type variables; p-values: * <0.1; ** <0.05; *** <0.01.

include private creditors tend to proceed more slowly, perhaps because they will be less familiar with the procedural details.

The duration of insolvencies tends to decrease in response to the expansion of economic activity, especially when firms appear as debtors. This may reflect a particular sensitivity to the business cycle of sales of insolvent companies' assets, either as a going concern or in parts.

5.2. *Determinants of duration specific to firms*

The insolvent's sector of activity - vis-à-vis insolvent companies in manufacturing industry - has a clear impact on duration for the construction sector only, where proceedings tend to last longer, perhaps reflecting a composition of insolvency assets which makes their sale more difficult. A larger volume of fixed assets lengthens the proceedings, probably to the extent that this entails a more cumbersome process of liquidation. In addition, this variable is an approximation to the claim value and may capture procedural aspects that depend on this indicator.¹³ The overall liabilities measure the size of the claims involved in the case, having a positive impact on duration.

Microenterprise insolvencies tend to be quicker, even controlling for variables such as the value of assets and liabilities, reflecting additional features associated with the size of the firms that simplify the proceedings. Furthermore, the insolvencies of firms that have ceased activity tend to be shorter. In this case, insolvency practitioners will have their tasks simplified, as they do not have to deal with management issues and the liquidation of the firm itself may be easier.

The impacts of the explanatory variables relating to corporate insolvencies analysed so far are statistically significant along the duration tertiles, but, at the same time, there is no marked variation across them.

The existence of real collateral guaranteeing debts to financial institutions has a clear impact of slowing down the proceedings. Credits that benefit from real guarantees have priority over the other credits in the insolvency, up to the value of the assets given as a guarantee. Thus, in such cases, one will have to wait for the sale of these assets, in order to calculate the remaining debt that will compete with common credits (i.e. that are neither guaranteed nor have a privileged nature¹⁴). The existence of financial collateral tends to increase duration as well, but the impact is smaller and only visible for intermediate to long durations. In turn, the existence of personal guarantees, captured by the other collateral, tends to accelerate insolvencies, but the impact is confined to the last tertile. It should be noted, however, that these last two types of collateral do not have a statistically significant impact on duration, in the parametric model estimated in the next section.

5.3. *Robustness analysis*

One now carries out a robustness analysis, by estimating parametric models that assume a probabilistic distribution for duration time. The generalized gamma distribution was chosen because it approximates well the shapes, respectively, decreasing and approximately bathtub of the hazard functions presented in Graphs 5C and 5D.¹⁵

13. In insolvency proceedings, the claim value is measured by the amount of the assets.

14. Examples of credits with a privileged nature include debts to workers and to the State.

15. This family of distributions has other frequently used parametric models as particular cases, such as the exponential, Weibull and lognormal. The constraints associated with these models were tested and rejected against the more general model.

Table 3 presents the results of the estimation of the specifications above, for private and corporate insolvencies, based on the generalized gamma distribution. This model is estimated in the accelerated failure-time metric, and does not have a proportional hazards representation, such as the one underlying the Cox model. The estimation results (presented as the exponentials of coefficients) capture the multiplicative effect of regressors on the time to case closure, in terms of shortening or extending it. Thus, when the exponential of the coefficient is equal to 1, the regressor has no impact on duration to closure. If the coefficient exponential is less than 1, say 0.9, duration is reduced by 10%. If the exponential is greater than 1, say 1.1, duration is increased by 10%. Note that the interpretation of coefficients in this type of models is the opposite of the interpretation in the proportional hazards model, in which coefficients smaller (larger) than 1 mean an extension (shortening) of time to resolution.

Although the different metrics underlying the Cox model and the generalized gamma model do not allow comparing coefficient values, it is possible to compare the respective sign and statistical significance, as well as the relative sizes among regressors. The results in the two methodologies are, in general, very aligned.

As in the Cox model, the fact that the case is filed by the insolvent tends to shorten duration, while the intervention of more than one debtor (for private insolvencies) and of a larger number of creditors tends to prolong it. For private insolvencies, the impact on duration of the variables related to the type of creditor is more mitigated in the generalized gamma model. Indeed, in this case only the presence of private and financial creditors has a clear statistical significance, respectively delaying and accelerating the course of proceedings. In corporate insolvencies, the evidence for these regressors is entirely consistent across models, with an impact on duration being confined to the presence of public administration creditors, which speeds up proceedings.

The effects of both the business cycle throughout case lifetime and the firm-specific regressors are very much aligned between the semi-parametric and the parametric models. The extension of duration that comes from the insolvent's belonging to the construction sector and from the existence of real collateral guaranteeing debts to the financial sector stand out, as above, for its magnitude. In the parametric model, however, the existence neither of financial collateral nor of other collateral appear to have an impact on duration.

6. Duration to declaration of insolvency

In this section, one carries out an analysis of duration to declaration of insolvency. This period until the declaration of insolvency is the initial stage of the case, when it is still completely under the jurisdiction of a judge, prior to the appointment of the insolvency practitioner (see Section 2). Table 4 presents the impact of the variables relating to the case on duration according to both the Cox model and a parametric model based on the logistic distribution (estimated in the accelerated failure-time metric). The choice of this distribution is justified by the arc-shaped hazard function - see Graphs 5A and 5B. As before, we estimate a specification of the Cox model allowing time-varying coefficients,

	Private insolvencies	Corporate insolvencies
Requested by debtor (creditor)	0.50*** <i>0.00</i>	0.87*** <i>0.01</i>
Several debtors	1.02*** <i>0.01</i>	
<i>Number of creditors</i>		
4 - 5 (priv.) / 6 - 13 (corp.)	1.02*** <i>0.01</i>	1.05 <i>0.03</i>
Mais de 6 (priv.) / 13 (corp.)	1.03*** <i>0.01</i>	1.27*** <i>0.05</i>
<i>Type of creditor</i>		
Financial	0.97** <i>0.01</i>	1.04 <i>0.03</i>
Public administration	0.99* <i>0.01</i>	0.76*** <i>0.02</i>
Business	1.00 <i>0.01</i>	0.94 <i>0.04</i>
Private	1.04*** <i>0.01</i>	1.06* <i>0.03</i>
Public creditors in majority		0.92*** <i>0.02</i>
Cessation of activity		0.92*** <i>0.01</i>
Liabilities		1.05*** <i>0.00</i>
Fixed assets		1.02*** <i>0.00</i>
Microenterprise		0.91*** <i>0.02</i>
<i>Type of collateral</i>		
Real collateral		1.25*** <i>0.02</i>
Financial collateral		1.03 <i>0.03</i>
Other collateral		0.98 <i>0.02</i>
<i>Debtor's activ. sector (manuf. ind.)</i>		
Agriculture and mining		1.04 <i>0.07</i>
Construction		1.26*** <i>0.03</i>
Trade, food and accommodation		0.97 <i>0.02</i>
Other services		1.04* <i>0.02</i>
Economic activity (non-interacted)	0.98*** <i>0.00</i>	0.87*** <i>0.01</i>
Constant	4.95*** <i>0.23</i>	50.75*** <i>5.57</i>
N° observations	71,800	24,542

TABLE 3. Determinants of duration to closure, generalized gamma model

Notes: Table shows exponentials of coefficients, i.e. time-to-failure ratios, estimated assuming the generalized gamma distribution, stratifying by jurisdictional unit; omitted groups in parenthesis; standard-errors (in italics) adjusted to account for the variability stemming from the multiple imputation of the variables related to creditor type; p-values: * <0.1; ** <0.05; *** <0.01.

but only within 2 segments of duration, respectively below and above the median of

the survival function (15 days). Recall that the Cox model and the accelerated failure-time models have opposite coefficient readings, as coefficients greater than 1 mean a shortening of duration, in the first case, and an extension of it, in the second.

	Cox model: proportionality full duration	Cox model: proport. by duration segments up to 15 days over 15 dias		Loglogistic model
Requested by debtor (creditor)	5.47*** <i>0.06</i>	53.81*** <i>3.40</i>	4.08*** <i>0.06</i>	0.12*** <i>0.00</i>
Several debtors	0.82*** <i>0.01</i>	0.85*** <i>0.01</i>	0.82*** <i>0.01</i>	1.16*** <i>0.01</i>
<i>Number of creditors</i>				
4 - 5 (priv.) / 6 - 13 (corp.)	0.93*** <i>0.01</i>	0.93*** <i>0.01</i>	0.95*** <i>0.02</i>	1.05*** <i>0.01</i>
Mais de 6 (priv.) / 13 (corp.)	0.90*** <i>0.02</i>	0.91*** <i>0.02</i>	0.92*** <i>0.02</i>	1.05*** <i>0.01</i>
<i>Type of creditor</i>				
Financial	1.05*** <i>0.02</i>	1.05** <i>0.02</i>	1.05** <i>0.02</i>	0.96*** <i>0.01</i>
Public administration	1.01 <i>0.01</i>	1.00 <i>0.02</i>	1.02 <i>0.02</i>	1.00 <i>0.01</i>
Business	1.06*** <i>0.01</i>	1.03* <i>0.02</i>	1.07*** <i>0.02</i>	0.98 <i>0.01</i>
Private	0.98 <i>0.02</i>	0.99 <i>0.02</i>	0.99 <i>0.02</i>	1.00 <i>0.01</i>
Private insolv. (corporate)	1.07*** <i>0.01</i>	1.22*** <i>0.02</i>	0.96** <i>0.02</i>	0.91*** <i>0.01</i>
Constant				0.56*** <i>0.02</i>
Nº observations	72,885	72,885		72,885

TABLE 4. Determinants of duration to private and corporate insolvency declaration

Notes: Table shows exponentials of coefficients, i.e. hazard ratios (Cox regression) and time-to-failure ratios (generalized gamma regression), stratifying by jurisdictional unit; omitted groups in parenthesis; standard-errors (in italics) adjusted to account for the variability stemming from the multiple imputation of the variables related to creditor type; p-values: * <0.1; ** <0.05; *** <0.01.

The shortening of duration that comes from the case being initiated by the debtor is now even more visible than in Tables 1 and 2, especially in the first segment considered (up to 15 days). In fact, in such instances, there is no notification of the debtor, nor a possible opposition from his/her side which otherwise occupy a relevant length of time until the declaration of insolvency. The number of debtors and creditors also has a clear impact in terms of prolonging duration up to insolvency declaration, which may have to do with procedures for identifying the relevant creditors and debts. All these results hold both for the Cox model and in the parametric model.

The effects of the type of creditor variables differ from those previously presented for duration to closure, for example, as far as the lack of an impact of public administration creditors is concerned. Considering the evidence for parametric and semiparametric models jointly, only the presence of financial creditors - shortening duration to insolvency declaration - is statistically significant. Indeed credit institutions may be particularly routinized in the initial steps of insolvency proceedings. Finally, the fact that the court is dealing with private insolvencies (vis-a-vis corporate ones) speeds up insolvency declaration, possibly reflecting a lesser complexity.

7. Conclusions

Efficiency of insolvency proceedings can have relevant macroeconomic impacts and duration will be one of the key factors determining such an efficiency. Indeed, the speediness of proceedings is crucial not only from the point of view of safeguarding the interests of those involved, but also of the reallocation of productive resources. Most insolvency requests of households in Portugal are made by themselves. In these cases, duration of proceedings will be particularly relevant, in order for them to recover, as quickly as possible, from a vulnerable financial situation. Therefore identifying factors that shorten duration can provide important insights from the viewpoint of public policies. Other factors that determine the quality of the insolvency procedure, outside the scope of this article, include the recovery rate of claims and safeguarding the priorities of different creditors and the rights of insolvents.

A transversal result to private and corporate insolvencies is the increase in duration when the case is filed by a creditor and when there is a greater number of parties, both debtors and creditors. This occurs at the beginning of the case, until the insolvency declaration, as well as at later stages, until its closure. Therefore, it could be useful to analyse whether there would be room to speed up that declaration, particularly in such instances, without calling into question the rights of the parties. As regards duration to closure, there is evidence that the intervention of private creditors leads to greater delays, suggesting that more support in decision-making by this type of creditors could be beneficial. With regard to other features that extend the duration of corporate insolvencies, it should be mentioned the size of firms, the volume of debt and assets to be sold, the existence of real collateral and activity in the construction sector. A detailed analysis of the cases with such features could clarify the reasons for that.

The database used in this article allows us to identify the firms that went into insolvency in recent years. It would be interesting to compare the situation of companies before, during and after this procedure, with that of companies in similar conditions, but which have not resorted to insolvency. As for private insolvencies, which have increased significantly in recent years, the possibility of combining this information with other individual databases, namely regarding the employment situation and indebtedness, will open, when feasible, interesting research opportunities.

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Appendix: Descriptive Statistics

Variable	Unit	Observations	Mean	Standard deviation	Min.	Max.
Households						
requested by the debtor (creditor)	binary variable	72,244	0.90	0.30	0	1
specialised court	binary variable	72,244	0.90	0.30	0	1
several debtors	binary variable	72,244	0.24	0.43	0	1
debtors	number	72,244	1.24	0.43	1	6
several creditors	binary variable	72,244	0.91	0.29	0	1
creditors	number	72,244	5.17	3.71	1	228
private creditors	number	72,244	0.16	0.68	0	48
public creditors	number	72,244	0.32	0.56	0	6
financial creditors	number	72,244	2.11	1.82	0	20
corporations credits	number	72,244	0.91	1.68	0	144
unidentified creditors	number	72,244	1.23	1.80	0	107
Corporations						
requested by the debtor (creditor)	binary variable	29,706	0.50	0.50	0	1
specialised court	binary variable	29,706	0.92	0.26	0	1
several debtors	binary variable	29,706	0.01	0.07	0	1
debtors	number	29,706	1.0	0.18	1	29
several creditors	binary variable	29,706	0.90	0.30	0	1
creditors	number	29,706	18.14	41.12	1	1,532
private creditors	number	29,706	3.48	14.94	0	1,423
public creditors	number	29,706	0.66	0.78	0	16
financial creditors	number	29,706	1.25	1.85	0	20
corporations credits	number	29,706	6.98	20.73	0	1,207
unidentified creditors	number	29,706	5.34	16.45	0	972
<i>Central Balance Sheet Database variables</i>						
micro firm	binary variable	25,572	0.76	0.43	0	1
liabilities	millions of euros	25,572	1.97	52.3	0	7,890
fixed asset	millions of euros	25,572	0.68	43.8	0	6,850
public creditor with majority	binary variable	25,565	0.10	0.31	0	1
company with no activity	binary variable	25,572	0.34	0.47	0	1
agriculture and extractive industry	binary variable	25,571	0.01	0.12	0	1
industry	binary variable	25,571	0.22	0.41	0	1
construction	binary variable	25,571	0.16	0.37	0	1
retail, accommodation and restaurants	binary variable	25,571	0.37	0.48	0	1
other services	binary variable	25,571	0.23	0.42	0	1
<i>Central Credit Register variables</i>						
real collateral	binary variable	26,747	0.22	0.41	0	1
financial collateral	binary variable	26,747	0.10	0.30	0	1
other collateral	binary variable	26,747	0.50	0.50	0	1

TABLE A.1. Descriptive Statistics

Note: Liabilities and fixed assets are on 2016 prices.