Banco de Portugal
Banco de Portugal Economic Studies, Vol. VIII, No. 3

Corporate insolvency and restructuring during COVID-19

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July 2022

Abstract
How did corporate insolvency and restructuring mechanisms evolve during the COVID-19 pandemic? Even though economic activity contracted, the number of insolvency and restructuring filings remained stable in 2020 and dropped consistently below the historical average in 2021. There were opposing factors conditioning this trend. Lower economic activity led to fewer insolvency and restructuring filings. In the economic activity sectors that were the most exposed to the pandemic, the number of filings was above the historical average in 2020 and stayed close to the average in 2021. In the remaining sectors, the number of filings stayed below the average in 2020 and 2021. Empirical results based on a natural experiment show that the credit moratorium, a policy that supported firm continuation, reduced the probability of insolvency. State of emergency restrictions had a negative but small effect on the number of filings. (JEL: G28, G33, G38)

1. Introduction

Portugal suffered drastic changes to the organization of its economy during the pandemic. Many firms were forced to close or operate remotely. Consumers also suffered movement constraints, which limited their ability to buy goods and services. On the other hand, Portugal introduced unprecedented economic support measures such as credit moratoriums or furlough subsidies, which permitted firm survival.

Insolvency and restructuring are key resource reallocation procedures. As there was an unforeseen and large shock to economic activity, it is important to track these mechanisms during the pandemic. This analysis was done for other countries such as France (Cros *et al.* (2021)), Sweden (Cella (2020)) or the United States (Wang *et al.* (2021)). This study does the analysis for Portugal.

Acknowledgements: The author thanks the editor (Pedro Duarte Neves), Nuno Alves, João Amador, António Antunes, Manuel Coutinho Pereira, Inês Drumond, Luísa Farinha, Álvaro Novo, Lara Wemans, and participants at the Banco de Portugal *Exchange* seminar for their very useful comments. He also thanks Sara Serra a Cátia Silva for providing and explaining some of the datasets used in this study. These are the opinions of the author and do not coincide necessarily with the opinions of the Banco de Portugal or of the Eurosystem.

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Taking this context into account, the study tracks corporate insolvency and restructuring filings in Portugal during the pandemic, splitting the analysis into three parts. First, it does a brief description of the existing insolvency and restructuring mechanisms and of the special corporate support measures adopted during the pandemic. Firms might use two types of court procedure when they face financial difficulties: insolvency and the Processo Especial de Revitalização (PER). In Portugal, insolvency is a procedure used to repay creditors that typically leads to asset liquidation and creditor reimbursement. PER is a negotiation procedure between the firm and creditors that gives firms a three-month window to agree on a restructuring plan with creditors. Creditors cannot force the liquidation of the firm during this period. In 2020, Portugal introduced restructuring incentives and a new restructuring mechanism, the Processo Extraordinário de Viabilização de Empresas (PEVE), which allows fast restructuring without court costs. At the same time, Portugal adopted corporate support measures that avoided restructuring and liquidation. These measures, similar to the ones taken in other countries (Kozeniauskas *et al.* (2021)), included a moratorium and credit lines, subsidies to corporate activity, tax deferrals and a state-sponsored furlough scheme.

The second part of this study tracks the evolution of the number of insolvencies and restructurings in Portugal during the pandemic using microdata from *Citius*, the official repository of court documents for insolvency and corporate restructuring cases in Portugal. With this data, it is possible to track the number of new filings with weekly frequency. Even though there was a large economic contraction, the number of insolvencies and restructurings did not increase significantly during the pandemic. The number of filings remained stable in 2020 and dropped 27% below the historical average in 2021. This pattern affected both insolvencies and restructurings.

The third part of the study analyzes the mechanisms that affected insolvency and restructuring during the pandemic. Firm exposure to the effects of the pandemic led to an increase in the number of filings. In the most exposed sectors, the number of filings was above the historical average in 2020 and stayed at the historical average in 2021. In the remaining sectors, the number of filings remained stable in 2020 and dropped below the historical average in 2021. The difference in the filings growth rate between the most and the least affected sectors was significant: 39.6 pp in 2020 and 37.1 pp in 2021.

During the pandemic, Portugal suspended the deadline given to debtors to file for insolvency. To analyze the contribution of this suspension to the reduction in the number of filings, the study compares the evolution of debtor filings (affected by the deadline suspension) against other insolvency and restructuring filings. The drop in the number of filings was larger for filings that were not affected by the deadline suspension, therefore the suspension does not seem to be determinant to justify the drop in the number of filings.

During the pandemic, Portugal approved many corporate support measures, which makes it impossible to establish a causal relationship between all measures and changes in the number of insolvency and restructuring filings. Alternatively, the study measures the causal effect of the credit moratorium on the probability of filing for insolvency or restructuring using a natural experiment introduced in March 2020. A natural

experiment is an empirical analysis that is possible because of external factors in which the exposure of firms to the experiment is approximately random. In this study, the natural experiment is possible because the credit moratorium does not cover credit that is more than 90 days overdue. This external event allows the comparison between firms with two months of overdue credit in January 2020 (control group) and firms with two months of overdue credit in February 2020 (treatment group). Some firms in the treatment group have less than 90 days of overdue credit when the moratorium starts (March 18th 2020), therefore they have higher probability of accessing the moratorium than firms in the control group. These firms have a lower probability of becoming insolvent because having overdue credit is one the the factors that determines corporate insolvency. Belonging to the treatment group reduces the probability of insolvency by 2.5 pp, which represents a 39.1% drop in the probability of insolvency from 6.4% to 3.9%. Even though estimates are economically relevant, they have a high level of statistical noise. The effect of the moratorium is smaller and statistically not significant for restructurings. This effect is estimated in partial equilibrium, i.e. it ignores the effect of the moratorium on firms that are not in the sample and the interactions between firms. As the moratorium avoids overdue credit by firms that were healthy before the pandemic, general equilibrium interactions should reinforce partial equilibrium effects.

State of emergency declarations introduced changes in court operations, including building access restrictions and the usage of digital tools in court procedures. Restrictions led to a drop in usage of court buildings, especially in the first stage of emergency period (between March and May 2020). In this period, the usage of national payment cards at legal services dropped 54.3%. The number of filings dropped 10% in the first state of emergency period and changed negligibly in the second period (between November 2020 and April 2021).

The study only does a positive analysis of the evolution of the number of insolvency and restructuring filings during the pandemic. There are factors that make corporate insolvency and restructuring more or less desirable. On the one hand, fewer insolvency and restructuring filings reduce transfers of the means of production to more productive economic activities, leading to lower firm production (Acemoglu *et al.* (2018)). On the other hand, insolvency and restructuring filings may cause asset fire sales (Pulvino (1998))) or layoffs, with persistent and negative effects on wages (Graham *et al.* (2019)).

This study contributes to the literature that studies the adaptation of court-supervised insolvency and restructuring mechanisms to the pandemic. Historically, there is a negative relationship between firms' economic activity and the probability of insolvency or restructuring (Altman (1968)). In this context and in the absence of corporate support measures, the pandemic could lead o a significant increase in the number of insolvency and restructuring filings. The literature proposed various mechanisms to reduce the effect of the pandemic, such as moratoriums (Greenwood *et al.* (2020)), debt purchases (Crouzet and Tourre (2021)), subsidies (Saez and Zucman (2020)), or more judges (Iverson *et al.* (2020)). However, these measures may reduce the number of corporate insolvencies and restructurings for reasons that are unrelated to the pandemic. The results of this study are consistent with the predictions from this literature. By comparing firms from the sectors that were the most exposed to

the pandemic against firms from other sectors, the study concludes that the pandemic led to an increase in the number of insolvency and restructuring filings. The credit moratorium, a support measure given to firms during the pandemic, had a negative effect on the number of filings, including for firms already facing economic difficulties before March 2020.

This study is related to the literature that tracks the evolution of insolvency and restructuring filings during the pandemic in other countries. Wang *et al.* (2021) use a methodology similar to the one used in this study to track the evolution in the number of insolvency and restructuring filings in the United States. In 2020, filings dropped by 17% year on year. Credit moratoriums contributed to the drop in the number of filings, while physical barriers to court access had an unimportant effect. The evolution in the number of insolvency and restructuring filigns is similar in other countries. In France, the number of filings dropped by 45% between March 2020 and October 2021 when compared to the equivalent pre-pandemic period (Maadini and Hadjibeyli (2022)). In Sweden, the number of filings increased between March and May 2020 but reverted to the historical average in June 2020 (Cella (2020)).

The study also contributes to a better understanding of the Portuguese corporate insolvency and restructuring system. In this respect, Pereira and Wemans (2022) characterize the length of insolvency filings in Portugal. Bonfim and Nogueira (2021) show that corporate reorganization benefits workers in Portugal.

Finally, this study contributes to the literature that characterizes corporate insolvency and restructuring systems (e.g., Strömberg (2000) in Sweden and Bris *et al.* (2006) in the United States), discussing the corporate insolvency and restructuring mechanisms in Portugal, with an emphasis on the changes introduced during the period of the analysis and on the interactions between these mechanisms and corporate support measures.

2. Corporate insolvency and restructuring in Portugal

This section describes the insolvency and restructuring mechanisms in Portugal, focusing on judicial mechanisms (involving courts). There are also extrajudicial corporate restructuring mechanisms in Portugal. The legal literature studies legal developments in the Portuguese territory since the Roman period (e.g., Kalil (2017), Vasconcelos (2017)), Simões (2019))).

2.1. Pre-Covid framework

Firms facing financial difficulties may negotiate with creditors using extrajudicial negotiation mechanisms or court-supervised procedures. Courts are necessary to change firms' capital structure or management without creditor consent. The Portuguese corporate insolvency and restructuring system is regulated by the *Código da Insolvência e Recuperação de Empresas* (CIRE), introduced by Decree-law 53/2004. In its initial form, the law was based on the insolvency concept applied in Germany at the time (Insolvenzordnung). The law covers other entities such as individuals or associations.

In 2012, Portugal introduced the Processo Especial de Revitalização (PER). PER is a restructuring system inspired by *Chapter 11*, the corporate restructuring legal framework for American firms. PER allows debtors facing economic difficulties or imminent insolvency to submit a restructuring plan and negotiate with creditors without risking the immediate dismissal of the management or a sudden stop to economic activity. Plans are approved by a majority of creditors, and affect even those who vote against the plan or do not participate in the negotiation process. After approval, plan acceptance requires ratification by a judge. Bonfim and Nogueira (2021) explain PER with more detail.

Insolvency might be requested by the debtor or by creditors, while PER can only be requested by the debtor. Debtors must file for insolvency when they are in a situation of present insolvency (insolvência atual). Debtors are in present insolvency if they cannot comply with their overdue debt obligations, or when liabilities are substantially greater than assets. Present insolvency is unexculpable when in the debtor cannot largely comply with certain payment obligations for more than three months, such as tax or labor liabilities. The debtor might also file for insolvency if insolvency is just imminent (and not present). Firms that file for PER must face imminent insolvency or a difficult economic situation.

The insolvency process might end with the liquidation of firm assets and distribution of the insolvent estate between creditors or an insolvency plan. Liquidation is the dominant final outcome of the insolvency process. From the group of firms that file for insolvency, estimates show that only 1% of all firms restructure and survive (Ministério da Economia e do Emprego (2012)). This percentage might not reflect changes to the corporate insolvency and restructuring code introduced after 2012. A successful PER ends up with the approval of a restructuring plan by a majority of creditors and the ratification by the judge. This plan has the objective of keeping the firm operational.

2.2. COVID-19 period

In 2020 and 2021, Portugal adopted temporary measures that affected firm liquidation and restructuring. Some measures were direct, i.e. they implied changes to corporate insolvency and restructuring law. Other changes were indirect but potentially discouraged insolvency and restructuring.

Direct measures. Law 4-A/2020 suspended the deadline to file for insolvency from March 2020 onwards. Law 75/2020 introduced changes to corporate insolvency and restructuring law. The law promotes the restructuring of firms affected by COVID-19, especially through the Processo Extraordinário de Viabilização de Empresas (PEVE). This procedure differs from PER for being accessible to firms that are presently insolvent, having shorter deadlines and no court costs. Only firms demonstrably affected by the pandemic may use PEVE. The Law also promotes restructuring through PER by allowing that new funds disbursed by partners and shareholders have seniority over pre-existing credit. Before COVID-19, only creditors benefited from this prior ranking.

Indirect measures. At the same time, Portugal introduced measures that avoided corporate liquidation and restructuring indirectly (Kozeniauskas *et al.* (2021) also discuss these measures). Essentially, the measures are split into four groups: 1) a credit

moratorium; 2) state-guaranteed loans; 3) subsidies to firm continuation; 4) tax and social contribution deferrals and tax collection suspensions.

The credit moratorium allowed firms to postpone loan and/or interest payments to financial institutions. This measure was kept in force until September 2021 for most firms. The economic activity sectors that were the most exposed to the pandemic benefited from an additional 12-month loan maturity extension. Loans guaranteed by the state allowed firms to get credit with personal guarantees from the state. Firm subsidies promoted the continuation of economic activity. The *layoff simplificado*, a furlough scheme sponsored by the state, stands out as one of these measures. Additionally, the state gave subsidies through the *Apoiar* program to firms that suffered sales declines. Tax deferrals extended the deadline to pay taxes and social contributions, and allowed payments in installments.

3. Data

Corporate insolvency and restructuring data comes from the *Citius* website, a public repository that contains documents for these cases. The data collection procedure is similar to the one used by Bonfim and Nogueira (2021) and Pereira and Wemans (2022). This repository contains cases for firms and for other entities such as associations and individuals. The analysis filters *Citius* data to select non-financial corporations only. First, it restricts the dataset to restructuring cases (PER and PEVE) and insolvencies from legal persons. Within restructuring cases, the analysis focuses mostly on PER. PEVE is a recent procedure that did not have immediate adoption. The sample used in this study has 7 cases regulated by PEVE, with the first case being filed in March 2021. Second, the analysis keeps entities with the institutional code for non-financial corporations,[1] excluding legal persons such as associations. This procedure generates a series of insolvency and restructuring filings with daily frequency between 2017 and 2021. There is a gap between the court filing date and the submission of court documents to the platform that is heterogeneous between filings. This gap might cause the relative underreporting of cases at the most recent dates. The analysis addresses this problem by including only filings in which the difference between the date of the filing and the date of the first document is equal or smaller than 180 days and by restricting the dataset to events between January 2017 and June 2021. Table A.1 (online appendix) shows descriptive statistics for filings that were excluded by the 180 days criteria. Excluded filings represent approximately 4.8% of all filings. From the excluded filings, 93.8% are insolvency filings started by creditors. The weight of these filings is natural, given that the debtor might contest the insolvency before the case is opened. Using this procedure, the percent change in the number of new insolvency filings retrieved from the database is similar to the change obtained with official aggregate data (see Figure B.1 in the online appendix).

1. The institutional sector code comes from the Sistema de Partilha de Informação de Referência (SPAI), a database managed by Banco de Portugal. In this dataset, non-financial corporations have code S.11 in the European System of Accounts (ESA 2010)

Overdue credit data originates from the Central de Responsabilidades de Crédito (CRC). This database contains credit exposures above €50 from banks operating in Portugal. Overdue credit is obtained using values reported monthly for non-financial corporations[2] between January 2017 and December 2021.

The Classificação das Atividades Económicas (CAE) allows for the characterization of firms' economic activity sector. This data originates from Informação Empresarial Simplificada (IES), which contains the balance sheet and the income statement of the universe of resident non-financial corporations with annual frequency.

The study uses two datasets to measure the movement of people during state of emergency periods. First, it uses the payments database from the Sociedade Interbancária de Serviços (SIBS). This database contains monthly data on the number of payments done with payment cards issued in Portugal in the SIBS network using ATM and POS systems between 2018 and 2021. SIBS represented 85% of all operations with payment systems in Portugal in 2019, hence the data represents a substantial fraction of all payments made in Portugal.[3] The data is grouped by sector of activity. Second, the analysis uses Google Mobility Reports data for Portugal, which compares the intensity of movement by individuals to certain places (e.g., workplace) against the median measured between January 3 and Feburary 6 2020.[4] The data has daily frequency between Feburary 15 2020 and December 31 2021.

4. Descriptive statistics

Table 1 depicts descriptive statistics for the insolvency and restructuring cases included in the sample. There are important differences between the two types of filing. Firms with restructuring filings are considerably larger than firms with insolvency filings: restructurings represent 14% of the filings and 42% of the assets. The financial situation for firms with restructuring filings is also less degraded than for firms with insolvency filings, as expected from the different conditions to access the two procedures. When compared to the Portuguese average, firms with insolvency or restructuring filings have similar assets, more workers and worse operational and capital ratios. Insolvency and restructuring filings represent 2.7% of all firms in Portugal in 2016 and 4.9% of the workers of these firms.

5. Methodology and results

This section is divided into two parts. The first part tracks the number of corporate insolvency and restructuring filings during the pandemic. The second part analyzes the mechanisms that affect the number of filings.

2. Entities with code S.11 in ESA 2010.

3. See Cabral *et al.* (2021) to know more details about the SIBS payments database.

4. See details about Google Mobility Reports in `https://support.google.com/covid19-mobility/answer/9824897?hl=en&ref_topic=9822927`.

	Insolvency+ restructuring (1)	Insolvency (2)	Restructuring (3)	Difference (4)	All firms (5)
Assets (€M)	1.342	0.901	4.061	3.16***	1.554
	(7.336)	(6.154)	(11.983)		(50.216)
Workers	11.911	9.679	25.671	15.992***	6.569
	(51.700)	(47.225)	(72.008)		(84.824)
Asset/ workers (€ 000)	97.836	85.559	166.585	81.026***	88.179
	(143.700)	(133.074)	(177.675)		(124.315)
Equity ratio (%)	-119.112	-133.862	-30.382	103.48***	-3.907
	(292.339)	(306.680)	(156.925)		(116.889)
EBITDA/ assets (%)	-22.440	-24.911	-7.557	17.354***	0.021
	(49.626)	(52.035)	(27.022)		(32.124)
Observations	11,179	9,619	1,560		411,041

TABLE 1. Descriptive statistics for insolvency and restructuring filings

Notes: this table depicts descriptive statistics (averages and standard errors) for the insolvency and restructuring cases included in the sample. Column 1 contains descriptive statistics for all firms. Column 2 contains statistics for insolvency filings. Column 3 includes descriptive statistics for restructuring filings. Column 4 depicts the difference between insolvency and restructuring filings. Column 5 contains descriptive statistics for firms that report data in IES in 2016. Statistics for the assets/worker ratio, equity ratio, EBITDA/assets do not include firms whose ratio has denominator equal to 0. Extreme observations are winsorized at the 95% level. Standard errors are reported in parentheses. Data from preceding years is used when there is no data for the year before the filing. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant differences at the 10%, 5% and 1% levels.
Source: IES, Citius e the author's own calculations.

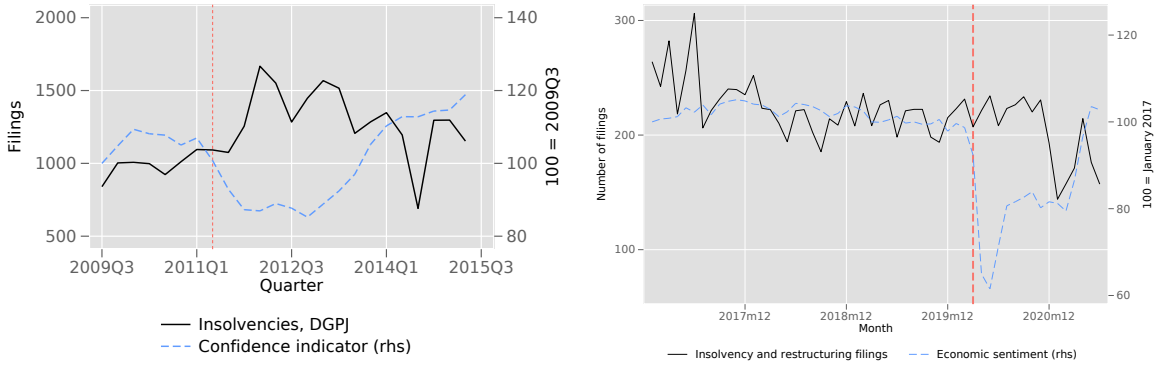
5.1. Insolvency and restructuring filings

Figure 1 shows the number of insolvency and restructuring filings in Portugal during the sovereign debt crisis (Panel A) and during the pandemic (Panel B). The dashed lines shows the economic sentiment indicator for Portugal.[5] As Altman (1968) and the extensive literature that follows it show, there is a historical negative relationship between the number of new filings and the intensity of economic activity. In Portugal, the number of filings grew steadily following the degradation of economic activity in the sovereign debt crisis. The economic sentiment indicator remained stable between the third quarter of 2009 and the second quarter of 2021, when the Memorandum of Economic and Financial Policies (memorandum of understanding) was signed. After the signing of the memorandum of understanding, the index dropped by 8%

5. The methodology for the confidence indicator is available at `https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys_en`

and 6% in the third and fourth quarters of 2011, respectively. The increase in the number of insolvencies happened gradually in the four quarters after the signing of the memorandum of understanding. In the third quarter of 2011 (quarter after the drop in the economic confidence indicator), the number of filings remained stable, but grew 17% in the fourth quarter. In the first quarter of 2021, there were 1,667 legal person insolvencies, the highest value in the sovereign debt crisis.

If the correlation between the economic confidence index and the number of insolvency and restructuring filings were similar during the pandemic, one would expect a gradual increase in the number of filings in 2020 and 2021. In March 2020 there was a sudden drop in the economic confidence indicator that persisted until the first quarter of 2021. However, the number of filings remained stable in 2020 and dropped in 2021. These values are consistent with findings from other countries. In the United States, the number of insolvency and restructuring filings dropped by 17% in 2020 (Wang *et al.* (2021)). In France, the number of filings dropped by 45% between March 2020 and October 2021 in comparison to the equivalent pre-pandemic period (Maadini and Hadjibeyli (2022)).



(A) Sovereign debt crisis (B) Pandemic

FIGURE 1: Insolvency and restructuring filings

Notes: in Panel A, the continuous line depicts the number of insolvencies for legal persons, according to DGPJ statistics. In Panel B, the continuous line depicts the number of insolvency and restructuring filings reported by Citius. The dashed lines depicts the monthly economic sentiment indicator for Portugal in both panels. I n Panel B, the dashed vertical line denotes the date of the first state of emergency declaration associated to the pandemic. Panel A does not present restructuring filings because these filings were only introduced by PER in May 2012.
Source: Banco de Portugal, DGPJ and the author's own calculations.

This study uses a methodology similar to the one used by Wang *et al.* (2021) to characterize the evolution of the number of filings with more detail. First, the data is grouped by weekly periods between January 2017 and June 2021. The base specification includes indicators for each week starting from the beginning of 2020, which allows the creation of confidence intervals and the comparison of the number of filings during the pandemic to the historical average before the pandemic. Seasonal and within-month variation is removed with fixed effects for the week of the month and the month of the

year. The specification also includes indicators for weeks with fewer than five business days because of holidays.

$$y_t = \alpha + \sum_{\tau=2020w1}^{2021w26} \beta_\tau \mathbb{1}_{t=\tau} + \gamma_{week} + \gamma_{month} + \gamma_{days} + \epsilon_t \quad (1)$$

y_t is the logarithm of one plus the number of filings,[6] $\mathbb{1}_{t=\tau}$ is an indicator equal to 1 in week $t = \tau$, γ_{week}, γ_{month} and γ_{days} are fixed effects for the week of the month, the month of the year and the number of work days in the week.

Alternatively, the study considers a specification that compares the number of filings after the pandemic, in 2020 and 2021. The inclusion of year indicators allows for the comparison of the number of filings in these periods against the historical average before the pandemic. The specification is given by:

$$y_t = \alpha + \beta_1 \mathbb{1}_{post,t} \times \mathbb{1}_{year=2020,t} + \beta_2 \mathbb{1}_{post,t} \times \mathbb{1}_{year=2021,t} + \gamma_{week} + \gamma_{month} + \gamma_{days} + \epsilon_t \quad (2)$$

$\mathbb{1}_{post}$ is equal to one from March 19 2020 onwards (state emergency declaration in Portugal)[7], $\mathbb{1}_{year=2020,t}$ is equal to one for weeks in 2020, $\mathbb{1}_{year=2021,t}$ is equal to one for weeks in 2021.

Figure 2 estimates the weekly evolution of the number of new filings using equation (1). There was no significant increase in the number of filings after the beginning of the pandemic in March 2020. From January 2021 onwards the number of filings dropped consistently below the historical average. The historical average contains insolvency and restructuring filings between 2017 and 2020, a period when gross domestic product growth was higher in Portugal than in the Euro Area [8] and the number of filings was stable (see Figure 2).

The lag between the beginning of economic difficulties faced by firms and the date of the filings potentially contributes to the gradual reduction of the number of insolvency and restructuring filings in 2020 and 2021. In the subsample of firms that completed three months of overdue credit in February 2020 and that had insolvency or restructuring filings in the subsequent months, the average difference between being overdue and the filing was 7.8 months.

Figure 3 repeats the exercise from Figure 2 but separates insolvency filings from restructuring filings. The evolution in the number of filings is similar for insolvencies and restructurings. In 2020 there was no significant increase in the number of filings, while in 2021 the number of filings dropped consistently below the historical average.

Figure 2 estimates equation (2), measuring the difference in the number of filings between the periods before and after the pandemic. Consistent with the previous results,

6. $log(1 + filings)$ is used instead of $log(filings)$ because there are weeks when the number of restructuring filings is 0.

7. Economic activity decelerated in the week of the state of emergency and in the previous week (see Lourenço and Rua (2021))

8. Average gross domestic product growth between 2017 and 2019 was 3% in Portugal and 2% in the Euro Area (source: Eurostat and the author's own calculations).

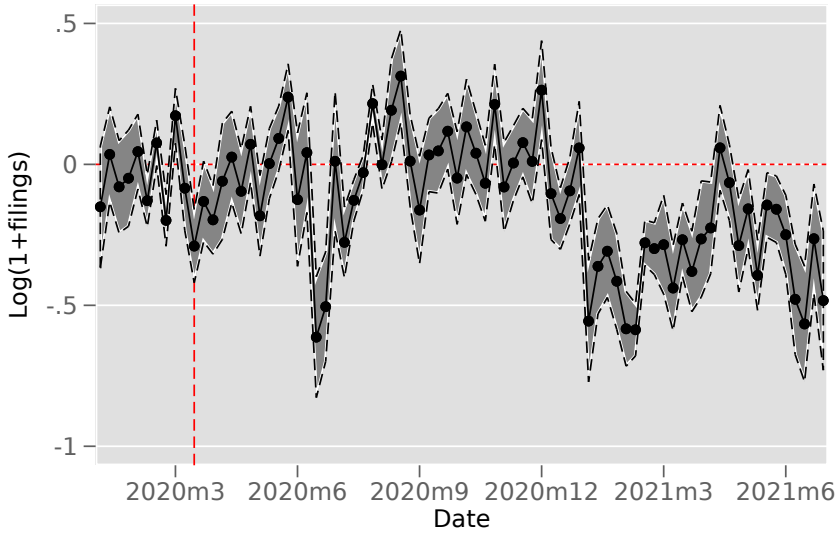
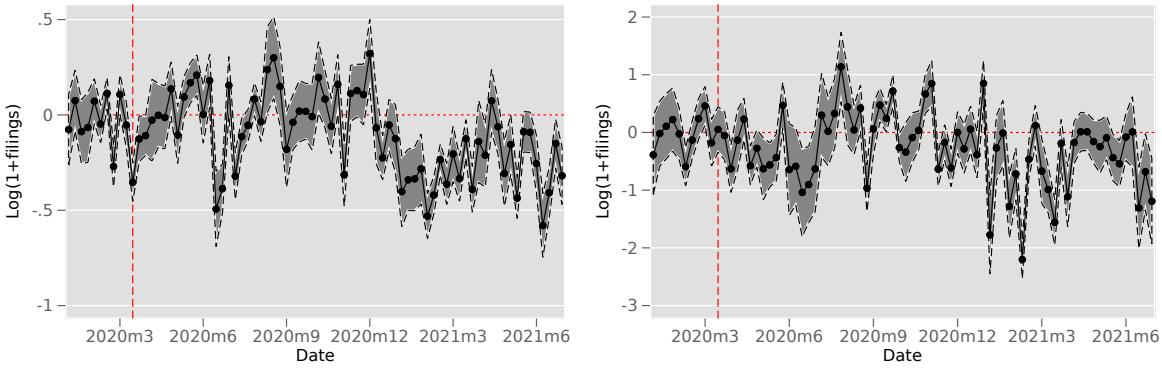


FIGURE 2: Weekly evolution of the number of corporate insolvency and restructuring filings

Note: this figure depicts the coefficients estimated in equation (1). Bands show 95% confidence intervals obtained with Newey-West confidence intervals (4 lags). The red dashed line denotes the week when the first state of emergency associated with the pandemic was declared in Portugal (March 19 2020).
Source: Citius and the author's own calculations.



(A) Insolvency (B) Restructuring

FIGURE 3: Weekly evolution of the number of filings, by type of filing.

Notes: this figure shows the coefficients from equation (1). Panel A shows coefficients for insolvency filings. Panel B shows coefficients for restructuring filings. Bands show 95% confidence intervals obtained with Newey-West errors (4 lags). The red dashed line denotes the declaration of the first state of emergency associated with the pandemic (March 19 2020).
Source: Citius and the author's own calculations.

the number of filings in the 2020 weeks affected by the pandemic was not significantly different from the historical average. In 2021, the number of filings was lower than the historical average. Obtaining an approximation to the percent change in the number of

filings from Table 2 estimates,[9] average weekly filings dropped 27% in 2021 (-24% for insolvencies and -43% for restructurings).[10]

	All filings (1)	Insolvency (2)	Restructuring (3)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	-0.015	0.005	-0.083
	(0.032)	(0.031)	(0.096)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	-0.313***	-0.270***	-0.568***
	(0.038)	(0.032)	(0.125)
Effect 2020	-1.5%	0.5%	8.0%
Effect 2021	-26.9%	-23.7%	-43.3%
R-squared	0.508	0.480	0.216
Observations	234	234	234

TABLE 2. Effect of the pandemic on insolvency and restructuring cases

Notes: this table estimates coefficients from equation (2). In Column the dependent variable is the logarithm of one plus the number of insolvency and restructuring filings. In Column 2, the dependent variable is the logarithm of one plus the number of insolvency filings. In Column 3, the dependent variable is the logarithm of one plus the number of restructuring filings. The table reports Newey-West standard errors in parentheses (4 lags). Values for rows *effect 2020* and *effect 2021* are obtained by transforming coefficient estimates using the formula $\frac{\Delta x}{x} = exp(\hat{\beta}) - 1$. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius and the author's own calculations.

5.2. Mechanisms

This section analyzes four mechanisms that potentially affect the evolution of the number of insolvency and restructuring filings during the pandemic. First, it measures the effect of the economic slowdown, comparing firms in the sectors that were the most exposed to the pandemic to firms from other sectors. Second, it analyzes the effect of suspending the obligation to file for insolvency, comparing the number of insolvency filings initiated by the debtor with the number of other filings. Third, it uses a natural experiment to measure the effect of the credit moratorium on the probability of insolvency and restructuring. Finally, it measures the impact of the state of emergency periods on the number of filings.

9. The approximation is given by $\frac{\Delta x}{x} = exp(\hat{\beta}) - 1$ (e.g., Graham *et al.* (2019)).

10. In the online appendix, Table A.2 assumes that the number of filings follows a Possion or negative binomial distribution or uses the the absolute number of filings as the dependent variable. Results are similar.

5.2.1. Economic activity

Table 3 estimates equation (2) separately for the sectors that were the most exposed to the pandemic and for the remaining sectors.[11] In the most exposed sectors, the number of filings increased 28.4% above the historical average in 2020 and was not significantly different from the historical average in 2021. In the other sectors, the number of filings was below the historical average in 2020 and 2021 (-11.2% and -35.1%, respectively). In Column 3, the difference in the number of filings between sectors diverged both in 2020 and 2021. The difference between the most exposed sectors and the least exposed sectors is significant: 40 pp in 2020 and 37 pp in 2021.

	Most exposed sectors (1)	Other sectors (2)	Difference (3)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	0.250***	-0.119***	0.369***
	(0.061)	(0.037)	(0.072)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	0.020	-0.432***	0.452***
	(0.053)	(0.047)	(0.067)
Effect 2020	28.4%	-11.2%	39.6 p.p.
Effect 2021	2.0%	-35.1%	37.1 p.p.
R-squared	0.227	0.532	0.271
Observations	234	234	234

TABLE 3. Effect of the pandemic on insolvency and restructuring filings, by sector

Notes: this table depicts estimation results for equation (2). In Column 1, the dependent variable is the logarithm of one plus the number of insolvency and restructuring filings in the most exposed sectors. In Column 2, the dependent variable is the number of insolvency and restructuring filings in the remaining sectors. In Column 3, the dependent variable is the difference between the dependent variable from Column 1 and the dependent variable from Column 2. The table reports Newey-West standard errors in parentheses (4 lags). Values for rows *effect 2020* and *effect 2021* are obtained by transforming coefficient estimates using the formula $\frac{\Delta x}{x} = exp(\hat{\beta}) - 1$. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius and the author's own calculations.

Figure 4 estimates equation (2), with the dependent variable being the difference between the logarithm of filings in the most exposed and the least exposed sectors ($\Delta log(1 + filings) = log(1 + filings_{affected,t}) - log(1 + filings_{other,t})$). $filings_{affected,t}$ is the number of filings in the most affected sectors and $filings_{other,t}$ is the number of filings in other sectors. The difference in the number of filings between the most and the least affected firms was consistently positive in 2020 and 2021.

11. The most exposed sectors are the sectors from Decree-law 78-A/2020. Results are similar using sectors from Decree-law 22-C/2021 and exposed sectors from the *Retomar* program.

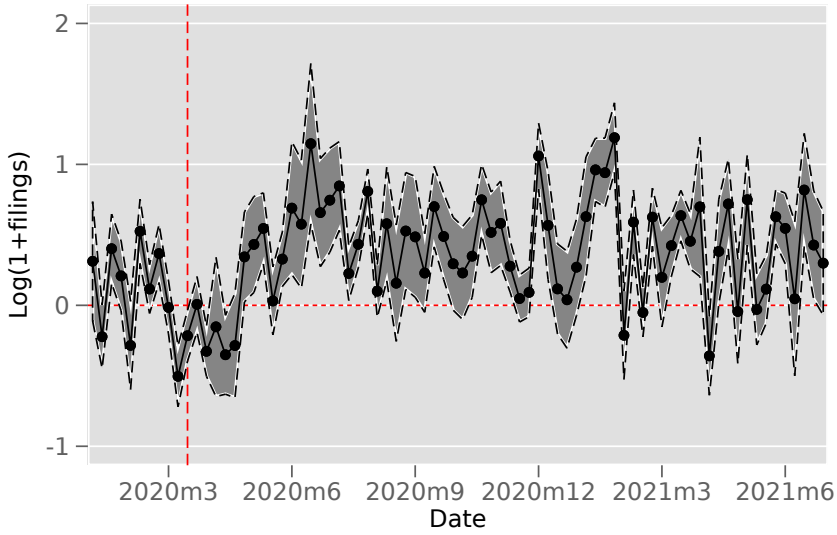


FIGURE 4: Filings in the most exposed vs. the least exposed sectors

Notes: this figure shows coefficients estimated using equation (1). The dependent variable is the difference between the logarithm of one plus the number of filings in the sectors that were the most exposed to the pandemic and one plus the number of filings in the remaining sectors. Bands show 95% confidence intervals obtained with Newey-West standard errors (4 lags). The red dashed line denotes the week of the declaration of the first state of emergency in Portugal associated with the pandemic (March 19 2020).
Source: Citius, IES and the author's own calculations.

5.2.2. *Suspension of the deadline to file for insolvency*

As mentioned in Section 2, debtors that are unable to comply with their debt obligations or that have assets significantly lower than liabilities must file for insolvency. This deadline was suspended during the pandemic, which might explain the drop in the number of insolvency and restructuring filings.

Table 4 contrasts the evolution of the number of insolvency filings submitted by debtors with the evolution of the other insolvency and restructuring filings. The suspension of the deadline to file for insolvency only affected insolvency filings submitted by debtors. If the drop in the number of filings were explained by the suspension of the deadline to file for insolvency, then one would expect the reduction in the number of filings to be concentrated in insolvencies filed by debtors. However, this pattern does not happen. The number of filings submitted by debtors increased 9.7% in 2020 and dropped 19.1% in 2021. The number other filings always changed negatively, dropping by 9.5% in 2020 and by 27.2% in 2021.

5.2.3. *Credit moratorium*

Support measures adopted during the pandemic allow for the continuation of economic activity and discourage resource reallocation (Caballero and Hammour (1996)). Assessing all measures is not doable, since there are many parallel measures with simultaneous effects on firms. This section uses a natural experiment to assess the existence of a causal relationship between one of the support measures –

	Suspended deadline (1)	Other filings (2)	Difference (3)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	0.093**	-0.112**	0.205***
	(0.040)	(0.044)	(0.057)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	-0.212***	-0.317***	0.105*
	(0.051)	(0.029)	(0.056)
Effect 2020	9.7%	-9.5%	19.3 pp
Effect 2021	-19.1%	-27.2%	8.1 pp
R-squared	0.300	0.416	0.165
Observations	234	234	234

TABLE 4. Insolvency and restructuring filings affected by the deadline suspension

Notes: this table presents results from the estimation of equation (2). In Column 1, the dependent variable is the logarithm of one plus the number of insolvency filings submitted by the debtor. In Column 2, the dependent variable in the logarithm of one plus the number of insolvency filings requested by debtors and restructuring filings. In Column 3, the dependent variable is the difference between the logarithm of one plus the number of insolvency filings submitted by the debtor and the logarithm of one plus the number of insolvency filings requested by debtors and restructuring filings. The table reports Newey-West standard errors in parentheses (4 lags). Values for rows *effect 2020* and *effect 2021* are obtained by transforming coefficient estimates using the formula $\frac{\Delta x}{x} = exp(\hat{\beta}) - 1$. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius and the author's own calculations.

credit moratoriums – and the probability of insolvency and restructuring. A natural experiment is an empirical analysis in which firms from the sample are exposed to the variables of the study in an approximately random manner because of external factors.

The study focuses on credit moratoriums for three reasons. First, moratoriums have a large impact on the insolvency process. With the moratoriums, firms do not have the immediate obligation to reimburse creditors, hence avoiding one of the conditions for being insolvent (being unable to comply with overdue debt obligations). Second, moratoriums affect the relationships between firms and creditors directly, who are the main recipients of the funds that are disbursed through insolvency and restructuring procedures. Finally, the design of the moratoriums in Portugal allows testing for the existence of a causality relationship between the corporate support measures and the probability of insolvency and restructuring.

The credit moratorium introduced in March 2020 excluded firms with overdue loans for more than 90 days.[12] This exclusion leads to a natural experiment because it affects firms with overdue credit in different ways. This exercise considers two groups of firms that were affected by the regulations in different ways. The control group contains firms that are overdue for two subsequent months in January 2020.[13] These loans cannot access the moratorium to avoid being overdue for three months because the moratorium does

12. For legal purposes, credit is overdue only if it complies with the materiality criteria from the Banco de Portugal Regulation 2/2019 and from the European Central Bank Regulation (EU) 2018/1845.

13. The study adopts an overdue credit criteria that is consistent with the criteria used by the legislation that introduces the credit moratorium. A given firm has two months of overdue credit if it has overdue

not apply in February 2020. The treatment group contains all firms that become overdue for two months in February 2020. Among firms in the control group, firms whose loans are less than 90 days overdue on March 18 2020 have access to the moratorium, therefore they can use the moratorium and avoid being three months overdue. The sample includes firms with overdue credit events before the events included in the analysis and firms with more than one overdue credit event. These exclusions avoids having firms both in the control group and in the treatment group.

The study measures the effect of the moratorium on these firms using a differences-in-differences specification. The *pre* period presents the probability of insolvency or restructuring up to the month when the firm has two months of overdue credit. The *post* period presents the probability of insolvency or restructuring in the periods after the month when the firm completes two months of overdue credit.

The specification is given by:

$$\mathbb{1}_{filing,i,t} = \alpha + \beta_1 \mathbb{1}_{treatment,i} + \beta_2 \mathbb{1}_{post,t} + \beta_3 \mathbb{1}_{treatment,i} \times \mathbb{1}_{post,t} + \epsilon_{i,t} \quad (3)$$

$\mathbb{1}_{filing,i,t}$ is an indicator that is equal to 1 when the firm has an insolvency or a restructuring filing in period t. $\mathbb{1}_{treatment,i}$ is an indicator equal to 1 if the firm is part of the treatment group (two months of overdue credit in February 2020). $t \in \{0, 1\}$, where 0 is the *pre* period and 1 is the *post* period.

Table 5 depicts estimates for coefficients in equation (3). The moratorium law causes a 2.6 pp difference between the treatment and the control group. This effect represents a reduction in the probability of corporate insolvency or restructuring of 34.7%.[14] Even though the coefficient has a considerable economic impact, the analysis contains a high level of statistical noise, as results are statistically significant only at the 10% level. From the 2.6 pp increase in the probability of a new insolvency or restructuring filing, 2.5 pp arise from the increase in the probability of insolvency. This effect represents a reduction of -39.1% in the probability of insolvency. The effect on restructurings is smaller (-14.3%) and statistically not significant at the 10% level.

The natural experiment has as its main advantage requiring a minimal set of econometric assumptions. However, the natural experiment is a partial equilibrium analysis, studying only firms included in the sample and abstracting itself from the effect of the moratorium on the economy. In general equilibrium, i.e. considering the effect of the moratorium on all economic agents and the interactions between agents, it is likely that the moratorium also reduces the probability of insolvency for other firms. With the moratorium, previously healthy firms that were affected by the pandemic could avoid becoming overdue and insolvent. Additionally, the shocks that affect some firms propagate to other firms through supply chains (Carvalho *et al.* (2021)). The moratorium reduced the effect of the pandemic by blocking the propagation of shocks through supply chain networks.

credit for two subsequent months in the CRC and the overdue amount each month is greater than €500 and represents more than 1% of total credit.

14. This value originates from the formula $\frac{\hat{\beta_3}}{\hat{\alpha}+\hat{\beta_1}+\hat{\beta_2}}$ using estimates from equation (3).

	(1) All cases	(2) Insolvency	(3) Restructuring
$\mathbb{1}_{treatment,i} \times \mathbb{1}_{post,t}$	-0.026*	-0.025**	-0.001
	(0.013)	(0.012)	(0.007)
$\mathbb{1}_{treatment,i}$	0.006	0.008	-0.002
	(0.008)	(0.007)	(0.004)
$\mathbb{1}_{post,t}$	0.035***	0.031***	0.005
	(0.010)	(0.009)	(0.005)
Constant	0.034***	0.025***	0.010***
	(0.006)	(0.005)	(0.003)
R-squared	0.004	0.004	0.001
Observations	4,198	4,198	4,198

TABLE 5. The effect of the pandemic on insolvency and restructuring filings

Notes. this table depicts results from estimating equation (3). In Column 1, the dependent variable is an indicator equal to one if there is a new insolvency or restructuring case. In Column 2, the dependent variable is an indicator equal to one if the firm starts an insolvency process. In Column 3, the dependent variable is an indicator equal to one if the firm starts a restructuring process. The table reports heteroskedasticity-robust standard errors. $^{*}\ p < 0.1$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$ denote statistically significant results at the 10%, 5% and 1% level, respectively.
Source: Citius and the author's own calculations.

Table 6 uses the percentage of creditors from the financial sector[15] in each filing to split the sample between firms whose share of creditors from the financial sector is above or below the median. There was a more significant reduction in the number of filings by firms with exposure to the financial sector greater than the median. These estimates corroborate results from Table 5. Moratoriums allow firms with exposure to financial creditors above the median to stop reimbursing their loans, which reduces the probability that these firms file for insolvency or restructuring.

5.2.4. State of emergency

This section analyzes the effect of state of emergency declarations on the number of insolvency and restructuring filings. There were two periods with state of emergency declarations. The first period happened in the beginning of the pandemic between March and the beginning of May 2020. The second period happened between November 2020 and April 2021. In these periods, there were restrictions to regular court operations, including the completion of some proceedings using remote work tools and the suspension of other proceedings.

15. Creditors belong to the financial sector if their institutional sector (ESA 2010) starts by S.12.

	Exposure > median (1)	Exposure ≤ median (2)	Difference (3)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	-0.138***	0.093***	-0.231***
	(0.040)	(0.033)	(0.037)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	-0.394***	-0.224***	-0.170**
	(0.059)	(0.044)	(0.070)
Effect 2020	-12.9%	-8.9%	-20.6%
Effect 2021	-32.6%	-20.1%	-15.6%
R-squared	0.407	0.404	0.195
Observations	234	234	234

TABLE 6. Effect of the pandemic on insolvency and restructuring filings, firms whose share of financial creditors is above or below the median.

Notes: this table presents results from estimating equation (2). In Column 1, the dependent variable is the logarithm of one plus the number of insolvency and restructuring filings for firms whose share of financial creditors is above the median. Column 2 repeats the exercise for the remaining firms. In Column 3, the dependent variable is the difference bteween the dependent variable in Column 1 and the dependent variable in Column 2. The table reports Newey-West standard errors in parentheses (4 lags). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius and the author's own calculations.

The following equation assesses the effect of state of emergency declarations:

$$y_t = \alpha + \beta_1 \mathbb{1}_{emergency_1,t} + \beta_2 \mathbb{1}_{emergency_2,t} + \beta_3 \mathbb{1}_{post,t} \times \mathbb{1}_{year=2020,t} + \beta_4 \mathbb{1}_{post,t} \times \mathbb{1}_{year=2021,t} + \gamma_{week} + \gamma_{month} + \gamma_{days} + \epsilon_t \quad (4)$$

$\mathbb{1}_{emergency_1,t}$ is equal to 1 in the weeks when there is an ongoing state of emergency for at least one day between March and May 2020 (first state of emergency period). $\mathbb{1}_{emergency_2,t}$ is equal to 1 in the weeks when there is an ongoing state of emergency for at least one day between November 2020 and April 2021 (second state of emergency period). The analysis includes the variables $\mathbb{1}_{post,t} \times \mathbb{1}_{year=2020,t}$ and $\mathbb{1}_{post,t} \times \mathbb{1}_{year=2021,t}$ in the equation. β_1 and β_2 measure the change in the number of filings in the weeks of the state of emergency, controlling for the average change in the number of filings in 2020 and 2021 after the beginning of the pandemic.

Table 7 measures the effect of the state of emergency periods on the number of insolvency and restructuring filings. The first state of emergency period caused a 10.1% reduction in the number of filings. This reduction was relatively small when compared to the drop in in-person activity at courts, which might reflect the fact that urgent court cases (such as insolvencies and restructurings) were still processed during the state of emergency or the continuation of procedures using remote work tools. Payments in courts dropped by 54.3%. [16] The drop in in-person court activity reflected lower movement at other establishments in Portugal, as one can see in Columns 3 and 4 from Table 7. The second state of emergency period had a relatively smaller effect on

16. Payments at establishments with sector code 84230 (legal activities) are classified as court payments. However, this sector includes other establishments such as jails.

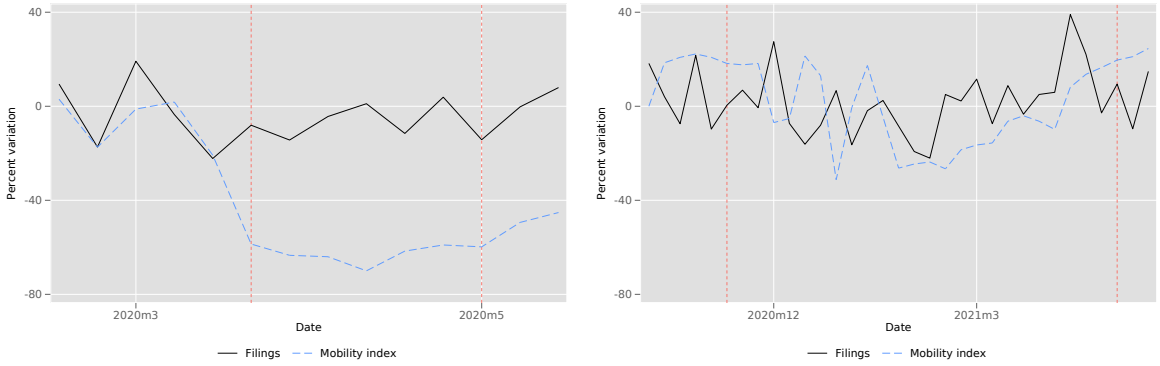
mobility. The results do not corroborate the existence of a reduction in the number of filings during this period.

	Filings (1)	Payments (courts) (2)	Payments (3)	Mobility (4)
$\mathbb{1}_{emergency_1,t}$	-0.106*	-0.784***	-0.333***	-0.516***
	(0.055)	(0.150)	(0.072)	(0.097)
$\mathbb{1}_{emergency_2,t}$	-0.000	0.036	-0.120***	-0.272***
	(0.054)	(0.137)	(0.031)	(0.083)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	0.004	0.015	-0.046**	
	(0.042)	(0.089)	(0.022)	
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	-0.318***	-0.174	-0.010	
	(0.048)	(0.129)	(0.033)	
Effect emergency 1	-10.1%	-54.3%	-28.3%	-40.3%
Effect emergency 2	0.0%	-3.5%	-11.3%	-23.8%
Effect 2020	0.4%	1.5%	-4.5%	
Effect 2021	-27.2%	-16.0%	-1.0%	
R-squared	0.513	0.425	0.860	0.692
Observations	234	182	182	72

TABLE 7. Effect of the state of emergency

Notes: the table presents results from estimating equation (4). In Column 1, the dependent variable is the logarithm of 1 plus the number of restructuring and insolvency filings. In Column 2, the dependent variable is the logarithm of the number of payments at establishments from sector 84230 (legal activities), correcting for a linear trend. In Column 3, the dependent variable is the logarithm of the total number of payments in all establishments, correcting for a linear trend. In Column 4 the dependent variable is the weekly average (excluding weekends) of the Google Mobility Reports mobility index for the *workplace* variable. Table 2 explains the method to retrieve annual and state of emergency effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius, Google Mobility Reports, SIBS and the author's own calculations.

Figure 5 tracks residuals from equation (2) during state of emergency periods. In Panel A, between February and May 2020, residuals were negative. Even though results are consistent with a reduction in the number of filings during this period, this reduction is much smaller than the drop in the mobility index. In Panel B, between September 2020 and May 2021, residuals were not consistently smaller than 0.



(A) First stage of emergency period (B) Second state of emergency period

FIGURE 5: Effect of the state of emergency periods on insolvency and restructuring filings

Notes: this figure shows residuals from equation (2) during state of emergency periods transformed into percent changes. Panel B reindexes the mobility index to have value 0 in the first week. Vertical lines depict the beginning and end of the state of emergency periods.
Fonte: Citius, Google Mobility Reports and the author's own calculations.

6. Conclusion

This study analyzes the evolution of the number of corporate insolvency and restructuring filings in Portugal during the COVID-19 pandemic. In Portugal, firms have access to an insolvency system that typically leads to liquidation, and to PER, which allows firms to negotiate with creditors and to restructure without capital structure unanimity. The pandemic affected insolvency and restructuring mechanisms directly by suspending the obligation to file for insolvency, introducing incentives to restructuring and reducing court costs. Indirectly, the credit moratorium, one of the corporate support measures approved in Portugal, allowed firms to avoid insolvency.

Even though there is a historical and negative relationship between corporate economic activity and insolvency and restructuring filings, the number of new filings did not increase during the pandemic. Filings stayed around the historical average in 2020 and dropped consistently below the historical average in 2021.

The study analyzes the factors that affected the evolution of the number of filings. First, the study analyzes the effect of lower economic activity associated to the pandemic on the number of insolvency and restructuring filings, comparing the number of filings at the most and least exposed sectors to the pandemic. Exposure to the pandemic led to an increase in the number of insolvency and restructuring filings. In the sectors that were the most exposed to the pandemic, the number of filings was above the historical average in 2020 and stayed at the historical average in 2021. In the remaining sectors, the number of filings was below the historical average in 2020 and 2021. Second, the study analyzes the effect of the corporate support measures on the number of filings. The suspension of the obligation to file for insolvency does not explain the drop in the number of filings, since the number of filings that were not affected by this suspension also went down. The results from a natural experiment suggest that

the credit moratorium avoided new insolvency filings, even though the analysis has a high level of statistical noise.

Finally, the study shows that temporary restrictions to court operations introduced by the state of emergency had a negative but small impact on the number of filings. The negative impact was concentrated on the first state of emergency period, between March and May 2020, but was significantly lower than the reduction of mobility in Portugal in the same period.

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Appendix A: Additional tables

	Included firms (1)	Excluded firms (2)	Difference (3)
Insolvency by creditors (%)	39.243 (0.488)	93.761 (0.242)	54.518***
Insolvency by debtors (%)	46.802 (0.499)	1.783 (0.132)	-45.02***
Restructuring (%)	13.955 (0.347)	4.456 (0.207)	-9.498***
Assets (€M)	1.342 (7.336)	1.899 (7.538)	0.556*
Workers	11.911 (51.700)	9.401 (19.022)	-2.51***
Assets/worker (€ 000)	97.836 (143.700)	172.783 (271.381)	74.947***
Equity ratio (%)	-119.112 (292.339)	-87.129 (254.743)	31.983***
EBITDA/Assets (%)	-22.44 (49.626)	-20.176 (49.866)	2.265
Observations	11,179	561	

TABLE A.1. Descriptive statistics for excluded insolvency and restructuring filings

Notes: this table depicts descriptive statistics (averages and standard errors) for insolvency and restructuring cases included and excluded from the sample. Columns 1 contains descriptive statistics for included filings. Column 2 contains statistics for excluded filings. Column 3 depicts the difference between excluded and included filings. Extreme ratio observations are winsorized at the 95% level.
Source: IES, Citius e the author's own calculations.

	Main specification (1)	Absolute number (2)	Poisson (3)	Negative binomial (4)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2020}$	-0.015	-1.141	-0.024	-0.019
	(0.032)	(1.488)	(0.030)	(0.031)
$\mathbb{1}_{post} \times \mathbb{1}_{year=2021}$	-0.313***	-14.493***	-0.323***	-0.325***
	(0.038)	(1.805)	(0.041)	(0.038)
Effect 2020	-1.5%	-2.3%	-2.4%	-1.9%
Effect 2021	-26.9%	-29.4%	-27.6%	-27.7%
R-squared	0.508	0.444		
Observations	234	234	234	234

TABLE A.2. Effect of the pandemic on insolvency and restructuring filings

Notes: this table depicts results from estimating equation (2). Column 1 repeats the exercise from Table2. In Columns 2 to 4, the dependent variable is the number of insolvency and restructuring filings. Column 2 estimates equation (3) using the absolute number of filings. Column 3 assumes that the number of filings follows a Poisson distribution. Column 4 assumes that the number of filings follows a negative binomial distribution. The table reports Newey-West standard errors in parentheses (4 lags). In Columns 1, 3 and 4 values for rows *effect 2020* and *effect 2021* are obtained by transforming coefficient estimates using the formula $\frac{\Delta x}{x} = exp(\hat{\beta}) - 1$. In Column 2, the values for rows *effect 2020* and *effect 2021* are obtained by dividing coefficients by the average number of filings in the pre-pandemic period (42.3). * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ denote statistically significant results at the 10%, 5% and 1% levels.
Source: Citius and the author's own calculations.

Appendix B: Additional graphs

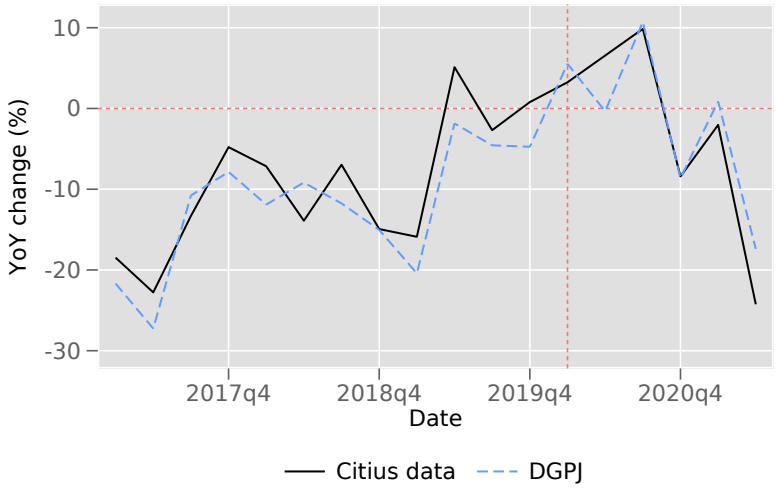

FIGURE B.1: Comparing Citius and aggregate data

Notes: this figure depicts the year-on-year percent change in the number of new insolvency filings. The continuous line uses the dataset described in Section 3. The dashed line uses aggregate data reported by Direção-Geral da Política de Justiça (DGPJ) for new insolvencies by legal persons.
Source: Citius, DGPJ and the author's own calculations.