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Firm level effects of Covid State Aid in Spain

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Abstract (100 words maximum):

This Master Thesis investigates the impact of COVID-19 state aid measures (COVID aid) on firm performance in Spain, with a focus on employment, turnover, profitability, and profit margin. Using a difference-in-differences (DiD) approach, the study compares firms that received COVID-19 aid with those that did not receive any state aid during the analyzed period. The results demonstrate that COVID state aid significantly improved firm performance metrics post-2020, highlighting the aid's role in helping businesses navigate the turbulence of the pandemic. The findings highlight the critical importance of targeted state interventions in maintaining employment and improving economic resilience during crises.

Keywords (minimum of four)

Covid-19 Pandemic, State Aid, Spain, Italy, Temporary Framework(TF), Firm Performance, Employment Impact, Orbis Database, Difference in Differences (DID), Propensity Score Matching (PSM).

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1. Introduction

The COVID-19 pandemic has left an indelible mark on economies worldwide, with Spain experiencing one of the most profound economic contractions in its history. In 2020, Spain's GDP shrank by 10.8%, marking its deepest recession in over 80 years (Chislett, 2021). The pandemic's impact on businesses was severe, with widespread disruptions to supply chains, decreased consumer demand, and significant liquidity shortages across key sectors. The impact of the pandemic varied across industries and businesses of different sizes. Sectors reliant on in-person interactions suffered more under the restrictions, while online businesses experienced fewer disruptions (European Commission, Directorate General for Economic and Financial Affairs, 2021). Smaller companies and medium-sized enterprises struggled more to survive, as they lacked access to global financial resources. To mitigate these challenges, the Spanish government, in collaboration with the European Union (EU), implemented a series of state aid measures under the *Temporary Framework for State Aid* (TF).

The TF, introduced by the European Commission in March 2020, provided member states with unprecedented flexibility to support struggling businesses while maintaining adherence to EU competition principles (Commission, 2020c). With the TF the Commission invoked Article 107(3)(b) of the TFEU, paving the way for state aid measures in times of serious economic disturbance (Commission 2020c). The TF enabled substantial state aid payments while ensuring that competition remained largely unaffected (Commission 2020e; 2020a; 2020d; 2021a; 2021b; 2022). The Commission implemented measures such as decentralizing economic oversight, suspending competition regulations, introducing innovative aid schemes and financial tools, fostering coordination between national and EU authorities, upholding constitutional protections, and steering the transition back to normal operations (Commission 2020c).

This framework enabled Spain to roll out a wide range of financial interventions, including guarantees, loans, and direct grants, with the primary objectives of safeguarding jobs, preserving firm stability, and ensuring economic resilience during the crisis. While these measures were critical in stabilizing Spain's economy, the extent to which they achieved their intended outcomes remains an open question. This study investigates the impact of state aid on Spanish firms, focusing on its effects on employment, financial performance, and profitability across different regions, sectors, and firm types. Using detailed firm-level data from the *Orbis* database, matched with the Spanish National State Aid Register, this analysis applies robust econometric methods to assess the causal impact of COVID-19 state aid on business outcomes.

The study's three primary objectives are as follows. Firstly, to provide a descriptive comparison of firms that received state aid and those that did not, highlighting differences in financial characteristics, regional distributions, and sectoral representation. Secondly, to evaluate how state aid influenced firm performance metrics, including employment levels, turnover, and profitability, while accounting for heterogeneity across regions and industries. Lastly, to estimate the causal effects of state aid on firm outcomes using a combination of *Difference-in-Differences (DiD)* analysis and *Propensity Score Matching (PSM)*, ensuring the robustness of the results. Initial findings reveal significant variations in the effectiveness of state aid across Spain. Regional differences highlight how factors such as pre-pandemic economic structure and the design of aid distribution influenced outcomes. Sectoral analysis further underscores those labor-intensive industries, such as construction, benefited the most, while other sectors demonstrated more modest improvements. For instance, in Northern Spain, state aid led to a (+3.9%) increase in turnover, indicating a focus on revenue stabilization. In the South, businesses achieved a (+7.0%) improvement in profit margins, reflecting a priority on financial stability over expansion. Madrid, as part of the Centre region, showed (+7.4%) growth in total assets, underscoring the role of aid in bolstering asset bases in economic hubs.

In terms of industries, the Construction sector recorded a (+5.7%) rise in employment, demonstrating the effectiveness of aid in preserving and expanding jobs in labor-intensive fields. Additionally, companies in low-margin categories used aid to stabilize profitability with a modest (+3.1%) increase in gross profit, while medium-margin firms saw a (+1.5%) rise in employment despite some trade-offs in efficiency. These results emphasize the importance of tailored state aid policies that address the unique challenges faced by different regions and industries during economic crises.

This paper contributes to the growing literature on the role of state aid during crises by offering a nuanced understanding of its impact on firm performance in Spain. It emphasizes the need for targeted and context-specific support mechanisms to maximize effectiveness and mitigate inequalities in aid distribution. The findings of this study align well with existing research on the impact of state aid on firm performance and employment during the COVID-19 pandemic (Bennedsen et al. 2020; Bertschek et al. 2022; Canzian et al. 2024; Konings, Magerman, and Van Esbroeck 2023). The findings provide valuable insights for policymakers to design more equitable and efficient state aid programs in future crises.

The paper is structured as follows: Section 2 discusses the regulatory framework of the TF and its implementation in Spain. Section 3 reviews the relevant literature on state aid. Section 4 describes the data sources, and the methodology employed. Section 5 presents the results, while Section 6 concludes with policy recommendations and suggestions for further research.

2. Regulatory Amendments through the Temporary Framework

The COVID-19 pandemic caused unprecedented disruptions worldwide, particularly impacting the economic stability of nations. In response, the European Union (EU) introduced the TF. On March 20th, 2020, the European Commission released its first communication on the TF. This initiative was required to allow for legislative changes to the established competition policy framework in the EU. The TF allowed member states to give businesses additional financial aid to compensate for the negative impacts of the economic crisis caused by the Covid-19 pandemic. While this framework was primarily focused on financial and monetary measures, its implementation significantly influenced constitutional structures and policies within the EU, especially in the context of state aid rules. This part explores these changes and how they impacted the legal and governance frameworks of the EU and its Member States. The COVID-19 pandemic created a severe public health and economic crisis. In record time, businesses faced liquidity shortages, disrupted supply chains, and fluctuations in consumer demand. (Ahmad et al. 2020; Das, Behera, and Paital 2022; Hardie et al. 2022; Canzian et al. 2024; Bennedsen et al. 2020; Bertschek et al. 2022; Brülhart et al. 2020; Le et al. 2020; Kaye et al. 2021)

To mitigate these effects, the European Commission invoked Article 107(3)(b) of the Treaty on the Functioning of the European Union (TFEU), which allows the EU to approve state aid measures during times of serious economic disturbances (Commission 2020c; *Article 107 TFEU* 2008).

The TF was built upon the existing state aid provisions within Article 107 of the TFEU. Under standard circumstances, Article 107(1) prohibits state aid that distorts competition within the internal market. However, article 107(3)(b) provides an exception for state aid measures aimed at remedying "a serious disturbance in the economy of a member state," making it a constitutional tool of flexibility in times of crisis (Commission 2020c). The COVID-19 pandemic clearly created such a disturbance, by heavily affecting the economies of all member states. By relying on this article, the TF allowed member states to offer aid to struggling

businesses without breaching internal market rules. The European Commission rapidly approved a series of state aid measures under this provision, providing a coordinated, yet flexible approach to economic recovery.

2.1 Regulatory Changes and Flexibilities Introduced

The Temporary Framework introduced several key legal changes, reflecting an evolution in EU governance and the distribution of powers between member states and the European Commission. These changes were particularly visible in the following areas:

Decentralized Economic Control: Under normal EU law, state aid measures are strictly regulated to maintain a level playing field within the internal market. However, the TF gave member states significant autonomy to design aid packages that best suited their respective national needs, if they followed to the broad parameters set by the Commission. This decentralization marked a shift in the balance of power, allowing national governments more direct control over economic interventions (Commission 2020c).

Temporary Suspension of Competition Rules: The core principle of EU state aid law is the maintenance of fair competition. However, by allowing state aid measures that would have otherwise been prohibited, the TF created a short-term constitutional suspension of this principle. While still operating within the bounds of article 107(3)(b), this suspension had far-reaching implications, enabling potentially unequal aid distribution across the EU based on the varying fiscal capacities of Member States (Commission 2020c).

New Aid Mechanisms and Financial Instruments: The TF introduced new forms of state aid, such as direct grants, tax advantages, and state-backed loans. The thresholds for such aid were capped at EUR 800,000 per undertaking, although these could vary depending on sectoral needs, particularly in agriculture and fisheries (Commission 2020c). Under EU law these instruments were previously not available to the same extent and reflected a significant shift in the tools available to national governments during economic crises.

Coordination Between National and EU-Level Governance: One of the key constitutional challenges addressed by the TF was the need to maintain coordination between national support measures and the EU's overarching governance structure. The frameworks parameters required member states to obtain the European Commission's permission for their intended aid measures. This process ensured that state interventions were consistent with EU objectives, such as the Green Deal and digital transitions while preventing fragmentation of the internal market (Commission 2020c).

Constitutional Safeguards and the Return to Normalcy: While the TF represented a significant departure from pre-pandemic constitutional norms, it was intended and framed as a temporary and exceptional measure. The framework was time-bound, with most of its provisions set to expire by 31 December 2020. However, The European Commission retained the right to review and extend the framework six times until December 2023. (Commission 2020c)

A critical constitutional safeguard embedded within the TF was the requirement that any state aid measures comply with proportionality principles. Aid had to be limited to what was strictly necessary to alleviate the economic damage caused by the pandemic, and national measures were subject to continuous periodic reporting to the European Commission (Commission 2020c). This ensured that the temporary suspension of competition rules did not become a permanent distortion of the EU internal market.

In its first amendments on April 4th, 2020, the Commission extended the TF enabling member states to support: "the research, testing and production of coronavirus relevant products, to protect jobs and to further support the economy in the context of the coronavirus outbreak" (Commission 2020e).

In summary, the instrumental changes brought by the TF during the COVID-19 pandemic changed the relationship between EU member states and the European Commission. By temporarily altering state aid rules, the framework allowed extraordinary flexibility in economic interventions, while maintaining a balance between national autonomy and EU-level oversight.

Although these changes were framed as temporary, they have set important precedents for how the EU might handle future crises, potentially reshaping its constitutional landscape in the long term.

2.2 Adaptions to the Temporary Framework

On May 8th, 2020, the Commission approved further monetary state aid over an estimated €1.9 trillion, which accounts for approximately 12% of the total GDP of the EU in 2020 (Eurostat 2021;(Eurostat 2021; Commission 2020a). This was done to increase liquidity for companies to keep people in labor, maintain research and development, and ensure a supply of goods for the battle against COVID-19 (Commission 2020a).

In its 3rd 4th 5th & 6th amendments, the commission continued to widen the scope and longevity of the TF. The amendments increased incentives for private investments, and enabled aid to cover uncovered fixed costs of companies harmed by the crisis. (Commission 2020d; 2020b; 2021a; 2021b).

On May 12th, 2022, the Commission announced the TF will not be prolonged after the 30th of June 2022, still some support measures were held in place until December 2023 (Commission 2022)

3. Spain´s support measures during the Covid pandemic

Spain was also among the hardest impacted economies in the union. The national GDP of Spain shrank by 10,8% in 2020, being the hardest recession in 80 years (Chislett 2021). The Spanish government, in collaboration with the European Commission, introduced a wide range of state aid measures under the EU's TF for state aid. These financial aids were aimed at mitigating the economic impact on businesses and individuals by providing liquidity, supporting employment, and ensuring the continuity of essential sectors.

Spain's response to the economic challenges posed by the COVID-19 pandemic was comprehensive and targeted multiple sectors. The wide range of state aid measures under the EU's TF permitted Spain to provide essential support to businesses and workers. These initiatives, which included liquidity provision, recapitalization, debt support, and sector-specific aid, not only helped companies survive the immediate impacts of the crisis but also laid the groundwork for a sustainable recovery. Through measures like wage subsidies, public guarantees, and loan extensions, Spain demonstrated a strong commitment to safeguarding its economy and protecting employment. (The Commission 2022) A detailed table of the state aid measures used by Italy can be found in the appendix of this work (Table 1).

4. Evidence from the State Aid Scoreboard

Overall, Spain and Italy provided a low average percentage of GDP for state aid between 2000 and 2022. Both countries, on average, spent below 0,5 percent of their annual GDP. This is comparable to other industry nations like the Netherlands and Belgium. Countries that are comparable in size, such as Germany and France, spent a higher share of their GDP on state aid. During the Covid-19 Crisis, Italy spent more in comparison to other countries while Spain remained a low-spending country. (Commission 2024)

The total amount of state aid spent across all member states increased significantly in the year 2020. This shows the TF's special role in overcoming the competition rules of the TFEU to battle the economic implications of COVID-19 (Commission 2024). Both Italy and Spain increased the share of their respective GDPs allocated to state aid significantly in 2020 and 2021, while Italy increased the share of their GDP allocated to state aid more than Spain (Figure 1.1). A Figure showcasing the Italy’s and Spain’s state aid expenditure in comparison to other EU member states can be found in the Appendix (Figure 2.1; 2.2 & 2.3)

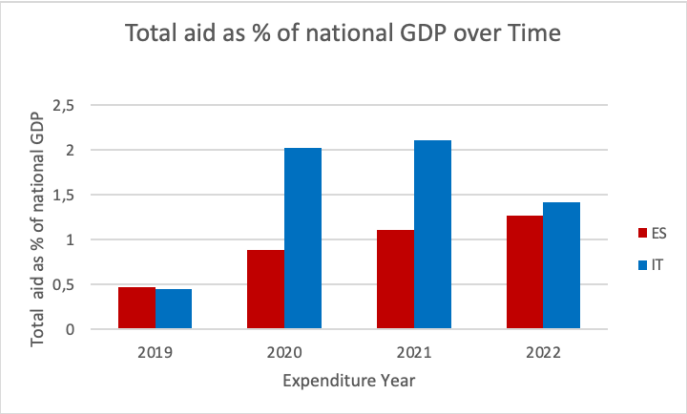

Figure 1 – Longitudinal developments of state aid expenditures as % of GDP for Spain and Italy during the pandemic years.

The state aid scoreboard is an instrument implemented by the Directorate-General for Competition in 2001; it is a benchmarking instrument to track the member states' expenditures for state aid (Commission 2024). The member states provide the data used in the scoreboard. The scoreboard gives interesting evidence of the differences in handling the COVID-19 crisis. For the years 2020, 2021, and 2022, there is a significant gap between the total aid spent by Spain and the total aid spent by Italy. Italy had a much higher expenditure to battle the Covid-19 crisis than Spain.

Between the years 2020 and 2022, Italy spent a total of 69.14 bn € in state aid to battle Covid-19, while Spain spent a total of 13,79 bn € in state aid to battle Covid-19 (Commission 2024).

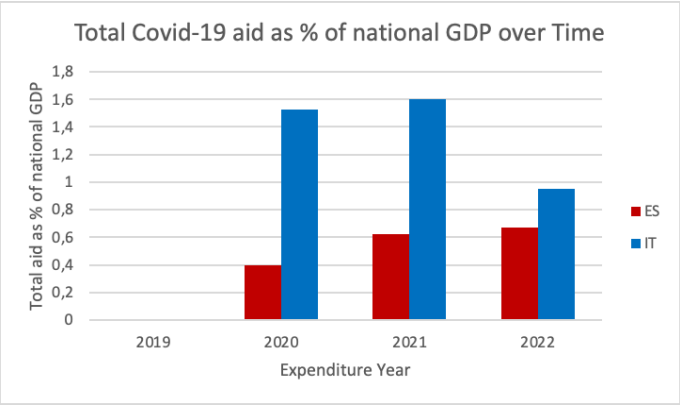

Figure 1.2 provides an overview of the total aid as % of the GDP provided for remedy for a serious disturbance in the economy in Spain and Italy between 2019 and 2022. The blue bar represents Italy, and the red bar represents Spain.

Objective	Remedy for a serious disturbance in the economy										
Sum of Total aid for remmedy for a seroius disturbance in the economy in current prices		Expenditure Year	Member State								
		2020		2020 Result	2021		2021 Result	2022		2022 Result	Total Result
Instrument	Case Type	ES	IT		ES	IT		ES	IT		
Direct grant		90,775	7684,5248	7775,2998	4084,0905	15220,8661	19304,9566	1126,4714	3193,7832	4320,2546	31400,511
Direct grant/ Interest rate subsidy			1295,7019	1295,7019		2568,924	2568,924	0,701	728,4215	729,1225	4593,7484
Guarantee		4080,7762	11126,6985	15207,4747	3009,7537	5893,3242	8903,0779	393,5569	3620,1812	4013,7381	28124,2907
Hybrid capital instruments (convertible bonds)					2,4		2,4	67,231		67,231	69,631
Interest subsidy		6,4011	24,62	31,0211	19,2533	11,5707	30,824	27,42	0,0519	27,4719	89,317
Loan/ Repayable advances									2,75	2,75	2,75
Other			247,9128	247,9128		210,7308	210,7308	6453,3135	276,179	6729,4925	7188,1361
Other forms of tax advantage						93,2775	93,2775		463,9099	463,9099	557,1874
Recapitalisation		216		216	512,406		512,406	840,7377		840,7377	1569,1437
Reduction of social security contributions			1413,424	1413,424		4185,7628	4185,7628		4994,0886	4994,0886	10593,2754
Repayable advances		0,0139	6,292	6,3059		2,339	2,339		6,9889	6,9889	15,6338
Soft loan		35,25	29,7	64,95	25,0477	5,525	30,5727	80,3215	153,0121	233,3336	328,8563
Subordinated debt						4,8	4,8		4,8	4,8	9,6
Tax advantage or tax exemption			3496,6767	3496,6767		919,6423	919,6423		4069,219	4069,219	8485,538
Tax allowance						15,008	15,008		917,3934	917,3934	932,4014
Tax base reduction									22,7792	22,7792	22,7792
Tax deferment									0,0185	0,0185	0,0185
Tax rate reduction									6,8304	6,8304	6,8304
Total Result		4429,2162	25325,5507	29754,7669	7652,9512	29131,7704	36784,7216	8989,753	18460,4068	27450,1598	93989,6483

Table 2: State Aid instruments to battle economic implications of Covid-19

Table 2 provides an overview of the economic measures implemented by Spain and Italy between 2020 and 2022 to address significant disturbances in their respective economies in the context of the pandemic. Over this period, Italy deployed substantially more aid than Spain, with a total of €93.89 billion, compared to Spain's €27.45 billion. Both countries increased their aid amounts year-on-year, with Italy's highest aid level recorded in 2022 at €36.78 billion, while Spain's peaked at €8.99 billion in the same year. A significant portion of Italy's aid came in the form of Direct Grants and Interest Rate Subsidies, which constituted €7.68 billion in 2020, rising to €15.22 billion in 2021 before dropping to €3.19 billion in 2022. Spain, on the other hand, focused on Guarantees, allocating or spending €4.08 billion in 2020, peaking at €5.89 billion in 2021, and then decreasing slightly to €3.62 billion in 2022. "A state guarantee enables a firm to obtain better financial terms for a loan than those normally available on financial markets" (Commission 2008) . Italy also made extensive use of Guarantees, with €11.11 billion allocated in 2020 and €8.90 billion in 2021, highlighting its emphasis on supporting liquidity and business operations through guaranteed loans.

In addition to these major instruments, Italy employed various tax-related measures, such as Tax Deferrals, which amounted to €3.49 billion in 2020, with this instrument being phased

out in subsequent years. Italy also made significant reductions in Social Security Contributions, particularly in 2021, when €4.18 billion was allocated. Spain's contribution under this category was much smaller, with €1.41 billion in 2020, dropping to €512 million in 2021. While Recapitalization played a minor role in Italy's measures (€216 million in 2020), Spain did not resort to this instrument. The use of Loans and Repayable Advances was more prominent in Spain during the later years, with €25 million in 2021 and €80 million in 2022. This increasing focus on loans suggests a shift toward longer-term financial support mechanisms. Both countries showed a trend of escalating aid efforts over time, with Italy's approach being more diversified and robust across various financial and fiscal instruments, while Spain primarily concentrated on guarantees and loan-related interventions. (Commission 2024)

5. Literature Review

The literature on State aid generally finds that government interventions such as grants, loans, and subsidies positively influence firm survival, employment, asset growth, and sales.

Dvouletý, Srhoj, and Pantea (2021) studied the impact of public investments on SME performance indexes in the European Union. By reviewing empirical evidence from over 30 studies, they find mostly positive relationships between state aid and company performance. Across the observed sample, the reception of government support schemes found positive outcomes for firm survival, employment, tangible and fixed assets, sales, and turnover. Two studies that reviewed the survival rate of subsidized enterprises indicate that subsidized enterprises show higher survival rates compared to non-subsidized enterprises with similar performance indexes (Pellegrini and Muccigrosso 2017; Srhoj, Škrinjarić, and Radas 2021).

Several studies find employment being positively impacted by government grants (Roper and Hewitt-Dundas 2001; Girma et al. 2008; Mole et al. 2009; Bernini and Pellegrini 2011; Koski

and Pajarinen 2013; Bia and Mattei 2012) Especially supported short-time work schemes, a mechanism where individual working hours are reduced to maintain workforce levels, have been particularly successful in preserving jobs, skills, and expertise to reduce negative effects from economic stress (Boeri and Bruecker 2011; Cahuc and Carcillo 2011; Drahokoupil and Müller 2021). In Italy, short-time work schemes even limited the growing financial inequality and poverty (Monteduro, De Rosa, and Subrizi 2024). Looking at firm growth variables like the change in fixed and tangible assets, which mostly show the purchase of new equipment, several studies show the positive effect of public financial support (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2014; 2017; Decramer and Vanormelingen 2016; Dvouletý and Blažková 2019; Srhoj, Lapinski, and Walde 2019). However, Špička (2018) finds no clear positive impact on fixed assets. Considering productivity variables, the literature paints a more nuanced picture. Some studies (Hartšenko and Sauga 2013; Decramer and Vanormelingen 2016; Srhoj, Lapinski, and Walde 2019; Dvouletý and Blažková 2019; Beņkovskis, Tkačevs, and Yashiro 2019) show a positive impact on firm performance; in contrast, other studies show a negative or non-significant effect on firm performance (Bernini and Pellegrini 2011; Cerqua and Pellegrini 2014; Špička 2018; Brachert, Dettmann, and Titze 2018).

While most of the studies on the effectiveness of state aid on company performance are aligning, positive outcomes from state aid in the case of COVID-19 are likely to have different implications. The COVID-19 pandemic caused almost unprecedented levels of governmental interventions to prevent the economic collapse of nation-states. In response, the European Union introduced the Temporary Framework (TF) for State aid. This allowed EU Member States to apply for substantial financial support for their respective businesses. The aid was specifically tailored for small and medium enterprises (SMEs) to mitigate liquidity shortages and avoid a ripple of bankruptcies. The support mechanisms included a mixture of direct grants, loans, interest rate subsidies, and tax advantages. The requirements firms had to comply with aimed at safeguarding short-term stability and long-term firm survival. The literature on the

effectiveness of these support measures has been extensive but draws a variety of different conclusions. The academic literature mostly agrees on positive short-term effects on firm liquidity and turnover, but the long-term impacts on productivity and market competition remain less clear.

Studies on the economic impact of state aid in the EU show mixed results. Tunali and Fidrmuc (2015) found that state aid did not significantly boost economic growth from 1992 to 2011. While some aid types had negative impacts, their effects were small (Tunali and Fidrmuc 2015; Poulou, Polemis, and Oikonomou 2023). Recent research by Poulou, Polemis, and Oikonomou (2023) indicated that well-targeted state aid could support growth, especially during crises (Poulou, Polemis, and Oikonomou 2023). However, Polemis and Stengos (2020) observed a negative effect: from 2002 to 2017, a 10% rise in state aid led to an average 1.65% drop in annual growth, suggesting that excessive aid might weaken competition and slow economic progress (Polemis and Stagnos 2020).

The COVID-19 pandemic prompted unusual levels of financial support aimed at avoiding an economic downturn. Various studies show that such support helped maintain employment and reduced the probability of firm exits. For instance, Bennedsen et al. (2020) showed that government support during the pandemic significantly reduced job separations and layoffs in Denmark, while Bertschek et al. (2022) found that emergency aid marginally improved the survival probabilities of self-employed workers in Germany. The empirical analysis of COVID-19 aid across EU countries such as Italy, Spain, and Poland by Canzian et al. (2024) suggests a broadly positive impact on firm turnover, particularly in Italy, where the effect was almost 9% higher than that of control firms. In contrast, Spain saw a more modest 3.2% increase, with notable variation across sectors. However, the effects on the probability of default were limited, with some evidence suggesting a slightly negative impact on financial stability. Canzian et al. (2024) used difference-in-differences (DiD) models combined with propensity score matching to estimate the causal effects of receiving COVID-19 aid on firm performance. This approach

compares firms that received State aid with those that did not, allowing for a robust evaluation of the intervention's impacts on turnover, employment, and survival. In the study, the Orbis dataset and national State aid registers were combined and provided longitudinal firm-level information, facilitating an in-depth analysis of firm behavior across different industries. The Study of Canzian et al. (2024) is the blueprint for this thesis.

One of the main goals of State aid during the COVID-19 crisis was to prevent firm exits and preserve jobs rather than directly enhance productivity (Commission 2020c). Thus, while short-term outcomes such as firm survival and turnover growth were positively affected, the evidence on productivity is mixed. Studies such as those by Konings, Magerman, and Van Esbroeck (2023) emphasize that COVID-19 support measures did not significantly foster growth or structural productivity improvements. The temporary nature of the aid, combined with loose targeting, made it effective in preventing immediate economic damage but less successful in promoting long-term creative destruction or reallocation of market shares. Harasztosi et al. (2022) find that the support was not awarded to underperforming firms and was mostly used to compensate for sales losses. Further, they show that the firms that have been supported lean towards a more optimistic investment strategy.

In 2024, Eurofound published a report titled *"Weathering the Crisis: How Job Retention Schemes Preserved Employment and Incomes during the Pandemic,"* which studies how EU Member States, through widespread job retention schemes, effectively preserved jobs and stabilized household incomes during the COVID-19 pandemic. Italy and Spain performed well compared to other EU Member States in terms of job retention and the overall impact of government interventions during the COVID-19 pandemic. Both countries are mentioned for their significant utilization of job retention schemes (JRS), which played a crucial role in safeguarding millions of jobs.

Italy stood out for the high participation rate in its job retention schemes, with 51% of Italian firms utilizing the national short-time working scheme, particularly during the early months of

the pandemic. This scheme covered approximately 40% of total employment in the country in March and April 2020. By the end of 2020, Italy had saved an estimated 4.71 million jobs, positioning it among the top three countries with the largest number of jobs preserved through JRS. However, despite this high participation, Italy experienced fluctuations in scheme enrollment throughout the year. A cohort analysis showed that many workers left the scheme after a few months, indicating a somewhat volatile use of the scheme, possibly linked to the reopening and re-locking of economic activities during different phases of the pandemic. Spain also implemented job retention schemes on a wide scale, although the magnitude of the interventions was relatively smaller compared to Italy. Spain used a furlough scheme instead of a short-term scheme like Italy. Spain's JRS saved 2.66 million jobs in 2020, covering 14.1% of total employment, placing it behind Italy but still among the top five EU countries regarding absolute job preservation. The effectiveness of the Spanish scheme was closely tied to the national restrictions imposed during the first wave of the pandemic, where large portions of the workforce benefited from state aid to mitigate job losses.

Both Italy and Spain benefited significantly from the EU's SURE program, which was instrumental in ensuring the required financial means for their respective JRS. While Spain's participation in job retention schemes was high, Italy's extensive and longer-term use of the program allowed it to save a larger percentage of jobs relative to its workforce. Spain's approach, while effective, saw slightly lower coverage. Notably, Spain experienced larger variations in job retention scheme impacts across different sectors compared to Italy, where the distribution of aid was more uniform. Both countries showed how the design of JRS, combined with national restrictions and economic conditions, shaped the outcomes in terms of employment stabilization. In summary, Italy and Spain performed strongly in preserving employment during the pandemic, with Italy showing a slightly larger impact through its more extensive use of JRS.

6. Data:

Firm-specific financial data are sourced from the Orbis database, which is compiled by the financial services provider Bureau Van Dijk (BvD)/Moody's. Orbis is a widely recognized and comprehensive resource commonly utilized in economic and financial research, offering detailed information on private and public companies across various countries. It is important to highlight that Orbis primarily covers the non-agricultural business economy, encompassing all sectors except agriculture and public services. Additionally, reporting delays can create variability in the data coverage that may impact the reliability of information for certain groups of firms (agricultural) that are not sufficiently represented (Bajgar et al., 2020). It is also important to highlight that Orbis primarily focuses on the non-farm business economy, covering all sectors except agriculture and public services. For the sector-specific analysis of this paper, the study focuses on construction, manufacturing, wholesale, and retail trade. The data available for the analysis spans over seven years (indicate the years), allowing the creation of a comprehensive firm-level data panel. Although Orbis has certain limitations, it remains the most extensive source of firm-level data for cross-country comparisons. The countries included in the analysis are also selected based on the availability of data for state aid recipients. The final dataset is an unbalanced panel, meaning that not all firms show complete data across all years and are included in the analysis. In this study, the treatment group consists of firms that received COVID-related financial support in 2020. Firms that benefited from other types of State aid, or those that received both COVID and non-COVID State aid in 2020, are excluded from the analysis. This approach simplifies the study and enables a clear comparison between the treatment and control groups. Furthermore, this simplification of the analysis allows for improved comparability of results between the two countries of choice. Assessing the coverage and representativeness of Orbis falls outside the scope of the proposed analysis, which concentrates on a specific, clearly defined group of firms.

To obtain accurate information on State aid beneficiaries, this analysis integrates data from the National State Aid Registers of Italy and Spain, which provide firm-level details of aid awards (European Commission, 2024). The National State Aid Registers are maintained by the respective Member States' Ministries of Economy and Finance to monitor all State aid distributed within their countries. These National Registers (NR) provide details such as the date of each aid award, the nominal value, the aid component, and information about the recipient firm, including its name, location, and national identifier. They also specify the firm's industry sector, the objective of the aid, and the specific reference to the aid measure. Critically, the NR datasets categorize the type of financial instrument used in the aid, distinguishing between guarantees, loans, direct grants, interest rate subsidies, tax advantages, and other less common instruments grouped into a residual category.

It is important to note that firms can receive multiple aid awards within a single year, each potentially involving a different type of instrument. Therefore, the NR datasets exhibit a multi-level structure, where firms may report multiple entries per year. To construct a firm-year panel dataset, the data is aggregated to calculate the total amount of aid granted to a firm in a specific year. Additionally, the expenditure by instrument type is also determined. The NR data spans from 2015 to 2022. Aid schemes related to COVID-19 by examining the description of the aid's objective. Aid was classified as COVID-related when terms such as “COVID State aid” or references to the legal basis for economic disturbance remedies related to COVID were present. Lastly, an additional analysis was carried out to improve the level of internal and external validity in the study. This second analysis functions as a robustness check and exclusively considers a balanced data panel. This means all missing values due to reporting errors are not considered in the analysis. The complementary results of this balanced data panel analysis will be presented in the appendix of the paper.

Spain 2019	Treated					Non-Treated				
Financial Variables	**Mean**	**Median**	**SD**	**Min**	**Max**	**Mean**	**Median**	**SD**	**Min**	**Max**
Turnover (€M)	1,815	0,444	12,673	0,001	1.289,180	2,981	0,258	75,488	0,000	16923,000
Loans (€M)	0,167	0,003	4,141	0,000	1.135,747	0,076	0,000	1,422	0,000	174,318
Total Assets (€M)	1,344	0,316	25,712	0,001	7.198,001	2,611	0,244	57,794	0,000	15220,000
Capital (€M)	0,102	0,006	1,108	0,000	158,981	0,327	0,006	13,394	0,000	3779,630
EBITD margin	2,672	2,420	11,177	-99,900	99,900	1,744	2,390	20,401	-100,000	100,000
Performance Variables	**Mean**	**Median**	**SD**	**Min**	**Max**	**Mean**	**Median**	**SD**	**Min**	**Max**
log_grossprofit	12,211	12,148	1,225	3,497	20,549	11,735	11,680	1,555	0,000	23,056
log_profitperemployee	1,500	1,386	1,229	0,000	8,889	1,907	1,792	1,555	0,000	8,845
log_profitmargin	0,831	0,896	1,332	-4,605	4,596	1,381	1,497	1,406	-4,605	4,605
Observations (N=)	219.423									

Table 3. Financial and performance firm characteristics in the year 2019, distinguished by firms that received state aid and firms that did not receive state aid in Spain

In Spain, turnover is higher for non-treated firms (mean: €2.981M) compared to treated firms (€1.815M). However, both groups have relatively low median turnovers (treated: €0.444M; non-treated: €0.258M), suggesting that most firms in both groups are small, with a few larger firms raising the mean. Loans among treated firms in Spain are higher (€0.167M) than those of non-treated firms (€0.076M). This suggests that treated firms in Spain may rely more heavily on external financing, a divergence from the Italian pattern where treated firms tend to operate with lower debt levels. Total assets and capital are higher among non-treated firms (€2.611M and €0.327M) compared to treated firms (€1.344M and €0.102M). This indicates that non-treated firms are larger and better capitalized in Spain. In terms of profitability, the EBITD margin is higher for treated firms (mean: 2.672%) than for non-treated firms (mean: 1.744%), although the high standard deviation across both groups indicates considerable variation. This shows a pattern where treated firms also exhibit higher average margins but with greater volatility. (Table 3.)

Performance measures show mixed results. While log_grossprofit is comparable between treated and non-treated firms, log_profitperemployee is higher among non-treated firms (€1.907 vs. €1.500 for treated firms). This suggests greater efficiency among non-treated firms, a finding that is consistent across both Spain and Italy. Similarly, log_profitmargin is slightly higher for non-treated firms, suggesting a slight edge in profitability margins. (Table 3.)

In Spain, a total of 842,024 companies were investigated, with the majority consisting of micro and small enterprises. Of these companies, 40% received state aid to mitigate the economic impact of the Covid-19 pandemic. Table 4 below highlights that large and medium-sized firms received proportionally less state aid compared to their smaller counterparts.

The following data illustrates how different company sizes benefited from state aid. Generally, larger firms received proportionally less aid than smaller enterprises.

Number of Employees Grouped	Treated (0)	Treated (1)	Total	% Treated (0)	% Treated (1)	% Total
0-1	552469	307277	859746	64,26	35,74	100
2-5	162865	143838	306703	53,1	46,9	100
6-10	70916	67574	13849	51,21	48,79	100
11-20	36431	30972	67403	54,05	45,95	100
21-50	16402	10737	27139	60,44	39,56	100
51-250	1781	609	239	74,52	25,48	100
251-500	724	166	890	81,35	18,65	100
501-1000	436	90	526	82,89	1711	100
Total	**842024**	**561263**	**1403287**	**60**	**40**	**100**

Table 4: Distribution of State Aid in Spain by Company Size in total and relative numbers

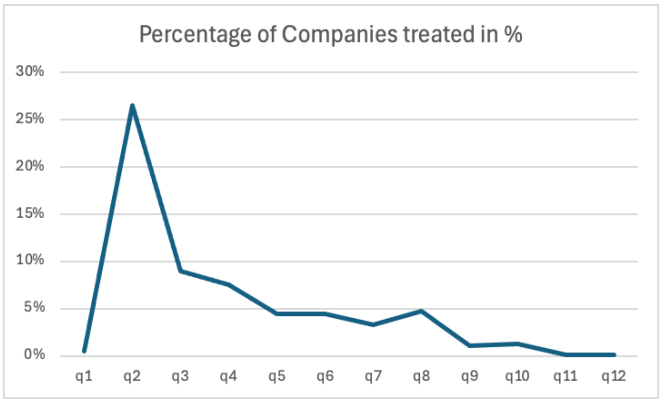

Figure 3: Distribution of Covid-Support from Q1 2020 to Q4 2022 in Spain in relative numbers.

During the initial year of the pandemic, the relatively largest share of Spanish firms benefited from state assistance, with approximately 40% receiving aid by the close of 2020. The proportion of firms supported slowly declined throughout 2021, eventually aiding nearly 55%

of businesses. However, in 2022, the rate of support decreased, reflecting a shift in the government's financial strategy following the development of the pandemic.

A comparison of financial indicators between firms that received aid (treated) and those that did not (non-treated) shows that treated firms initially had higher median financial values. Over time, the financial performance of treated and non-treated firms began to converge, suggesting that the aid mitigated financial disparity. This alignment suggests that state aid played a role in stabilizing businesses that were most vulnerable to pandemic-induced challenges, enabling many firms to sustain operations. Furthermore, it illustrates the requirements for receiving aid as by the Temporary Framework. Covid-19 support funds were designed to support vulnerable businesses, rather than keeping previously struggling firms financially afloat. This might explain why aided firms at times show for stronger initial financial indicators than their non-treated counterparts.

A regional breakdown of the aid distribution shows variability across Spain, with northern and central regions, particularly the Northeast, seeing lower percentages of firms receiving state support. Meanwhile, other regions, such as the Centre or the Canary Islands, have relatively higher levels of aid distribution (Figure 4).

A sectoral analysis reveals that state aid was more generously distributed among the manufacturing and wholesale industries. In these sectors, approximately 39% to 40% of firms received aid, indicating a balanced approach to government support across those sectors. The Construction industry shows with 33%, a reasonably lower share of aided firms (Figure 5).

A comparison of financial indicators between firms that received aid (treated) and those that did not (non-treated) shows that treated firms initially had higher median financial values. Over time, the financial performance of treated and non-treated firms began to converge, suggesting that the aid mitigated financial disparity. This alignment suggests that state aid played a role in stabilizing businesses that were most vulnerable to pandemic-induced challenges, enabling many firms to sustain operations. Furthermore, it illustrates the requirements for receiving aid

as by the Temporary Framework. Covid-19 support funds were designed to support vulnerable businesses, rather than keeping previously struggling firms financially afloat (see Figures 6.1, 6.2, 6.3). This might explain why aided firms at times show for stronger initial financial indicators than their non-treated counterparts.

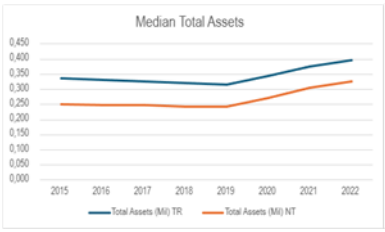

Figure 6.1: Median Turnover

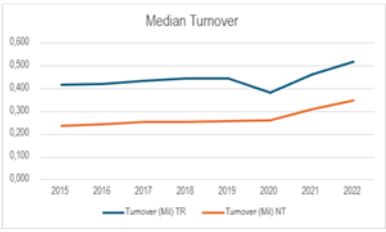

Figure 6.2: Median Total Assets

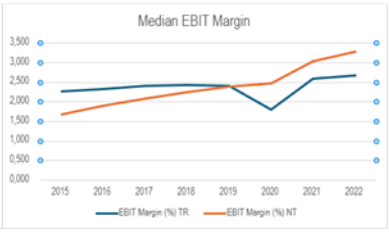

Figure 6.3: Median EBIT Margin

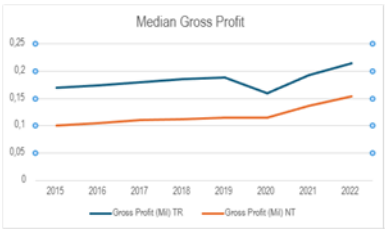

Figure 6.4: Median Gross Profit

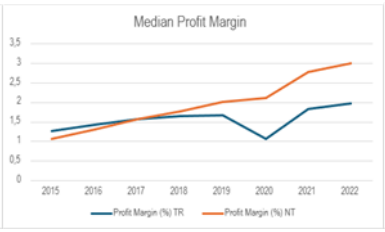

Figure 6.5: Median Profit Margin

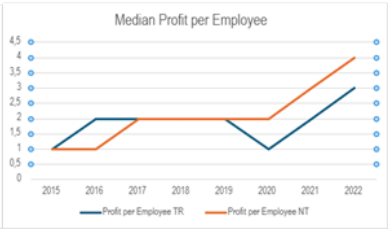

Figure 6.6: Median Profit per Employee

Figure 6: Shows the median values for firm performance variables between 2015 and 2022 and distinguishes between companies that received state aid in 2020 and companies that did not receive state aid in 2020.

7. Methods

This study employs a combination of econometric methods to analyze the impact of state aid policies. Specifically, it utilizes the difference-in-differences (DiD) approach to estimate causal effects by comparing changes in outcomes between treated and non-treated groups over time. To enhance the validity of the results, propensity score matching (PSM) is applied to create a comparable control group that closely resembles the treated group based on observable characteristics. Additionally, fixed effects regressions are used to control for unobserved heterogeneity at the regional, sectoral and firm levels, ensuring robust and consistent estimations.

7.1 Difference in Differences (DiD)

The main tool of analysis used in this study is a Difference-in-Differences (DiD) approach, implemented with two-way fixed effects (TWFE) models across various regions and economic industries in Italy and Spain. DiD is a widely accepted method for estimating causal effects when treatment assignment is not random. It compares changes in outcomes over time between treated and control groups under the assumption that these groups would have followed parallel trends in the absence of treatment (Cunningham, 2021). However, as the assignment of COVID-19 aid was determined by the strict requirements of the European Commission's Temporary Framework (TF), the assumption of parallel trends may not naturally hold. To address this, the study combines DiD with propensity score matching (PSM), resulting in a Difference-in-Differences Matching (DDM) approach. This method, as first formalized by Heckman, Ichimura, and Todd (1997) in the *Review of Economic Studies*, strengthens the identification strategy by ensuring comparability between treated and control groups. Specifically, propensity score matching is used to establish common support, limiting the analysis to firms within the overlapping range of propensity score distributions for both groups. By employing DDM, the study enhances the robustness of the Average Treatment Effect on Treated (ATT) estimate of COVID-19 aid, addressing potential biases and ensuring the validity of the results.

7.2 Propensity Score Matching (PSM)

This method matches treated firms (those that received COVID-19 support) with similar non-treated firms based on observable characteristics, creating a control group that is comparable to the treatment group. For each firm that received aid, the method matches it with one or more non-treated firms that had similar observable characteristics before the aid was given. This allows the (selected) non-treated firms to serve as a counterfactual, representing how the treated firms would have performed without receiving state aid. Assuming there are no differences

between these firms in terms of unobservable factors, this approach simulates a scenario where the aid was assigned randomly. To carry out the matching process, the probability that a firm received COVID-19 support based on its observable characteristics, known as the "propensity score," is first calculated. Next, each firm that received aid is matched with a, or multiple, non-treated firms that have comparable propensity scores, due to similar observable characteristics in the data. PSM is a widely recognized technique for reducing selection bias in observational studies. It helps to create a balanced comparison between treated and non-treated groups. However, the effectiveness of PSM relies on the quality of the matching variables. In this case, ensuring that important covariates (e.g., geographical differences, pre-treatment financial performance) are included in the matching process is crucial. Additionally, the main strategy for analyzing the causal effects of COVID-19 state aid on firm performance combines PSM with DiD to strengthen the internal validity by accounting for both observed and time-varying unobserved factors. However, it should be noted that PSM only shows controls for observable characteristics. If important unobserved factors (e.g., management quality, innovation capacity) influence both a firm's likelihood of receiving COVID-19 support and its financial performance, the estimates might suffer from omitted variable bias.

To avoid potential biases linked to the effect of the aid granted in 2020, matching is based on firm characteristics from 2019. The logit regression model is structured as follows:

$$\Pr(AID_i \mid Z_i) = F(a + \beta Z_i)$$

Model 1. – Computation of Propensity Scores

where AID is an indicator for whether the firm received COVID-related aid, F(.) represents the logit function, and Z_i is a vector of pre-treatment firm characteristics. Firstly, the sector of activity, defined by the NACE Rev. 2 two-digit classification in Orbis. Three broad industry sectors are considered, including manufacturing, construction and retail & wholesale. Secondly,

the geographic region, a dummy variable, identifies each firm's location according to the Nomenclature of Territorial Units for Statistics (NUTS) at level-1, accounting for geographical variation and regional differences. Lastly, a list of financial variables: capital, loans, total assets, and EBIT margin are also included to capture relevant financial metrics that may impact a firm's likelihood of receiving aid.

Propensity scores, which indicate the likelihood of a firm receiving COVID aid, are computed for both aided and non-aided firms based on model (1). Within the difference-in-differences (DiD) approach, propensity scores serve multiple purposes. They can refine the control group by selecting only firms that closely resemble those receiving aid or can be applied as weights in a DiD regression that includes all observations. Using weights allows for a balanced distribution of characteristics across treated and control firms, effectively standardizing the likelihood of receiving aid.

The weights for each firm *i* are calculated as follows:

$$\begin{cases} \dfrac{1}{p_i}, for\ firms\ that\ received\ aid \\ \dfrac{1}{1-p_i}, for\ firms\ that\ did\ not\ receive\ aid \end{cases}$$

To guarantee the robustness of the DiD estimates, the common trends condition is imposed. This restricts the analysis to the subset of firms whose propensity scores overlap across both treated and control groups, thus maintaining comparability.

7.3 Matching

This section showcases the matching process and distribution of Propensity Scores for both nationwide and regional data sets. The following histograms illustrate how the characteristics of treated and untreated firms are balanced, and their respective propensity scores overlap.

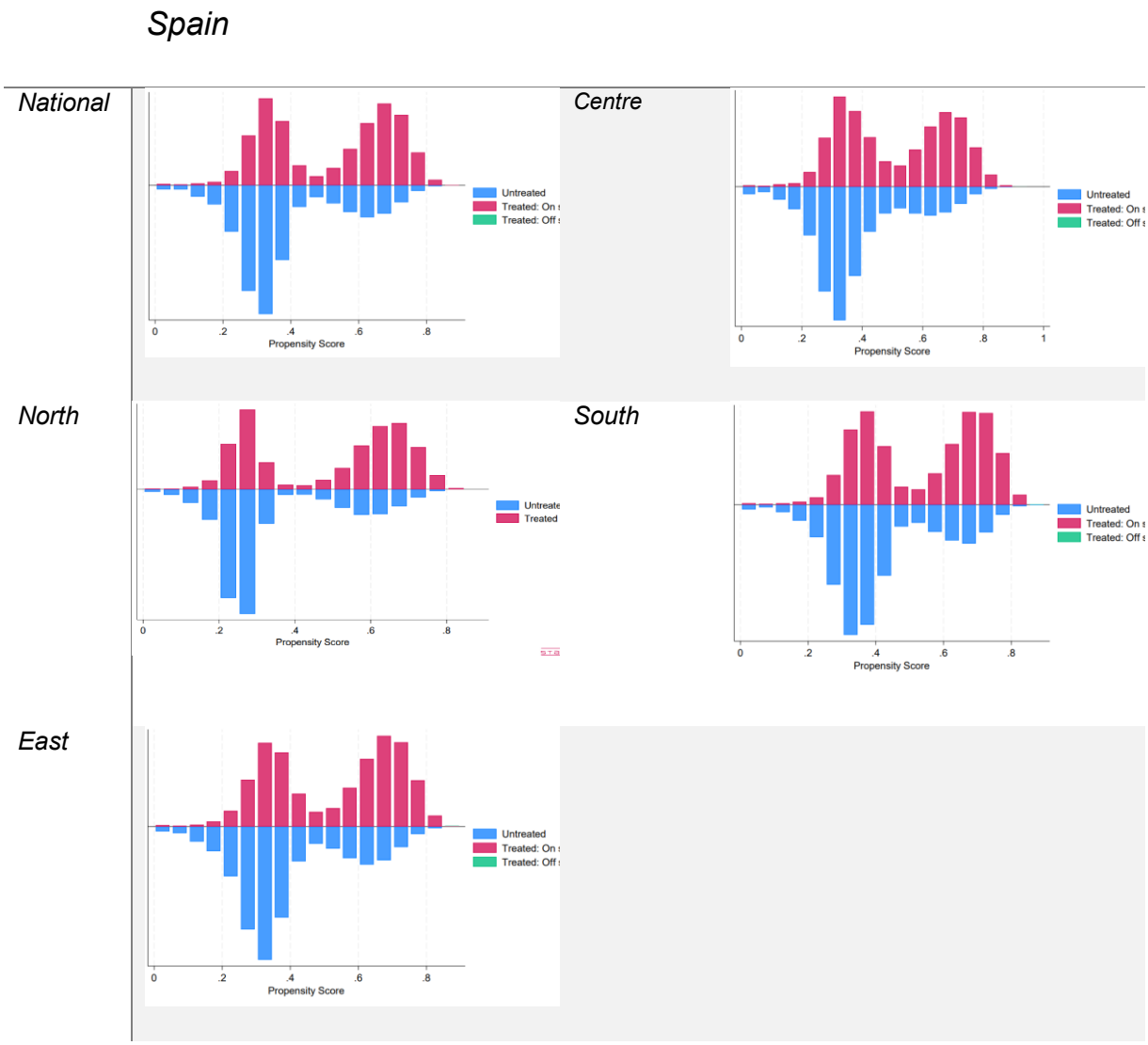

Table 5: Propensity Score Distribution across domestic and regional data samples for Spain.

In Spain, across all regions, the treated group tends to have a wider range of propensity scores compared to the untreated group. For instance, at the national level, treated individuals have scores spanning roughly from -0.3 to 0.5, while the untreated group is concentrated more between -2 and 3. This indicates significant overlap, but a moderate group of treated individual firms with propensity scores greater than 3 remain without a corresponding untreated partner. A similar pattern is seen across the North and Centre regions, with treated individuals showing scores from approximately -3 to 5, while the untreated group's scores are more centered between -2 and 2. The observed bimodality and symmetry in the propensity score distributions are indeed noteworthy, deviating from the expectation of a single mode and a skewed distribution reflecting differences between treated and untreated firms. This phenomenon can be attributed

to the diverse characteristics of firms within both treated and untreated groups. Factors such as regional and sectoral heterogeneity, variations in firm size, and differences in financial health prior to the pandemic may have contributed to the overlapping and multimodal distribution patterns. The symmetry observed suggests that the matching process successfully balanced the propensity scores across treated and untreated firms, which is critical for ensuring comparability. Future studies could explore the sources of this bimodality in greater detail to refine the matching process further.

7.4 Unmatched Observations

In Spain's data, unmatched individuals, represented by the "treated off support" group, are concentrated in the tail of the distributions. For Spain, particularly in the Centre and South regions, a significant number of treated individuals with scores higher than three do not have a matching untreated counterpart (see Table 5). This indicates that there remains a residual portion of the treated group that falls outside the range of available untreated individuals.

7.5 Fixed Effects Models

To further enhance the accuracy of the analysis, a regression model accounting for two way firm fixed effects is employed. This approach allows the capture of firm-specific time-invariant characteristics that could affect the outcome variables. Fixed effects models are a widely used approach to control for unobserved heterogeneity in panel data, where observations are collected over time for the same units. In the case of the Orbis data set, these are the relevant financial variables for firms in the years 2019 – 2022. This method is appropriate for addressing biases arising from time-invariant firm characteristics. This is due to the multiple potential sources of bias in regression models that arise from variables not directly observed or included in the model. For example, firm characteristics such as corporate culture, management style, location, or historical reputation may influence outcomes but are difficult to measure. However,

these factors are likely to be constant over time but can vary between firms. Fixed effects models remove this type of bias by altering out any time-invariant characteristics. A potential alternative approach would be to use random effects models if the assumption of fixed effects is too restrictive.

8. Results

In this section, the effectiveness of state aid on company performance in Spain will be examined based on the results of the DiD analysis.

8.1 Effects of State Aid on Company Performance in Spain

During the Covid-19 pandemic, governments across the European Union deployed unprecedented state aid packages to support businesses facing severe financial strain due to lockdowns, supply chain disruptions, and declines in consumer demand. In Spain, these interventions aimed to stabilize vulnerable sectors, safeguard jobs, and prevent the economic crisis from deepening, particularly in regions and industries hardest hit by the pandemic. The following section will evaluate the results of the effectiveness of state aid on company performance in Spain based on the results on the previously conducted DiD analysis.

8.1.1 Regional Differences in the Effects of State Aid

Country (Region)	Spain (National)	Spain (North)	Spain (East)	Spain (Center)	Spain (South)
Turnover (IHS)	0,008**	0,039***	-0,006	0,010	-0,003
	(0,018)	(0,000)	(0,276)	(0,161)	(0,723)
Total Assets (IHS)	0,071***	0,081***	0,067***	0,074***	0,072***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,000)
Capital (IHS)	0,023***	0,020***	0,026***	0,025***	0,016***
	(0,000)	(0,000)	(0,000)	(0,000)	(0,009)
log Number of employees	0,016***	0,031***	0,007	0,024***	0,009
	(0,000)	(0,000)	(0,147)	(0,000)	(0,259)

log gross Profit	0,010***	0,033***	-0,002	0,010	0,006
	(0,001)	(0,000)	(0,647)	(0,106)	(0,389)
log profit per employee	0,008	-0,001	-0,001	-0,016	0,057***
	(0,258)	(0,930)	(0,963)	(0,300)	(0,000)
log profit margin	0,019***	-005	0,015	-0,001	0,070***
	(0,003)	(0,725)	(0,154)	(0,941)	(0,000)
Ebit Margin (IHS)	0,024***	-0,002	0,020**	0,009	0,073***
	(0,000)	(0,897)	(0,030)	(0,432)	(0,000)
Sample Size (N=)	665 256	137 783	254 123	152 384	120 952

Standard errors in parentheses. *** p<0.01,
** p<0.05, * p<0.1.

Table 6: Average treatment effect of firms that received state aid in 2020. Shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The table provides an overview of the differences in effectiveness of state aid in Spain for a variety of financial variables.

In the Centre region, pandemic-related state aid had a particularly strong association with growth in Total Assets (IHS), with a coefficient of (0.074***). This suggests that in Madrid, a major economic hub where businesses were severely impacted by pandemic restrictions, state aid was effectively used to bolster asset bases, allowing companies to maintain stability and plan for post-crisis recovery. Madrid's reliance on aid for capital accumulation likely reflects the city's role as a central business and financial center, where preserving assets was crucial for maintaining competitiveness and ensuring business continuity during the pandemic. Meanwhile, in Spain's South region, Covid-19 aid seems to have focused more on improving profitability. This is evident from the significant effect on log profit margin (0.070***), which indicates that businesses in this region, already economically diverse and in some parts more tourism-dependent, used state aid to improve cash flow and stabilize finances. The focus on profitability rather than expansion highlights a survival-oriented approach during the pandemic, with companies prioritizing short-term financial health over growth.

In Northern Spain, state aid had a significant positive effect on Turnover (IHS), with a coefficient of (0.039***). This finding suggests that businesses in the North responded to state aid by maintaining or expanding revenue streams, possibly through adaptive strategies to keep operations running despite the pandemic's disruptions. The focus on revenue generation here

could indicate that Northern Spain's diversified industries were better positioned to leverage aid for stabilizing income during uncertain times. In summary, the Covid-19 state aid distributed across Spain's regions reveals important differences in focus and impact. Madrid's reliance on aid for asset stability, the South emphasis on profitability, and the North's response in turnover growth illustrate the need for a region-specific approach during crises. Each region's unique response to pandemic aid underscores the importance of tailoring future aid packages to address regional economic characteristics in times of crisis.

8.1.2 Industry Differences in the Effects of State Aid

The Covid-19 pandemic also highlighted how sector-specific dynamics shaped the impact of state aid within Spain's industries. Wholesale, Manufacturing, and Construction sectors each displayed unique responses to the government support provided during this period, reflecting the varying degrees of disruption and recovery needs across these industries.

Spain			
Country (Region)	Wholesale	Manufacturing	Construction
log Number of employees	0,009* (0,080)	0,010 (0,135)	0,057*** (0,000)
log gross Profit	0,009 (0,125)	-0,002 (0,764)	0,050*** (0,000)
log profit per employee	0,018 (0,163)	-0,003 (0,815)	-0,029** (0,032)
log profit margin	0,029** (0,010)	0,013 (0,269)	-0,026** (0,033)
Ebit Margin (IHS)	0,026*** (0,008)	0,015 (0,189)	-0,002 (0,841)
Sample Size (N=)	219 443	151 384	196 524

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7: Average treatment effect of firms that received state aid in 2020. Shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The table shows the industry differences in the effectiveness of state aid in Spain

In the Construction sector, state aid distributed during the pandemic had a significant effect on both log gross Profit (0.050***) and log Number of employees (0.057***). Construction, heavily affected by lockdowns and supply chain issues, likely used state aid to offset lost

revenue and support employment in an industry that required substantial manpower to complete delayed projects once restrictions were lifted. Aid appears to have played a dual role, not only improved profitability but also enabling firms to retain and, in some cases, expand their workforce to meet pent-up demand as the economy began to reopen. This indicates that during crises, labor-intensive sectors like construction may benefit most from aid that focuses on both financial stability and job preservation.

In the Wholesale sector, pandemic-related aid showed a statistically significant effect on the log profit margin (0.029**) but not on employment. Wholesale businesses, which experienced disruptions in supply chains and shifts in demand, may have used state aid to maintain profitability by improving operational efficiency rather than expanding employment. The sector's focus on profitability likely reflects a need to stabilize finances during a period of fluctuating consumer behavior, rather than investing in workforce expansion. As a result, aid policies tailored to Wholesale during the pandemic may need to focus on financial stabilization rather than job creation.

In contrast, the Manufacturing sector shows limited statistically significant results, suggesting that pandemic-related aid had a less clear or immediate effect on this industry. Manufacturing businesses vary widely in capital and labor needs, which may mean that pandemic aid alone wasn't enough to produce significant results across such a diverse sector. For instance, high-tech manufacturers may require technological support, while traditional manufacturing firms might benefit more from direct financial relief or infrastructure investment. This suggests that in times of crisis, state aid for Manufacturing could be enhanced by targeted support that meets the sector's specific needs, such as grants for digital transformation or resilience in supply chain management. It should also be noted that the data used for Manufacturing also grouped entries for firms operating in the Retail industry. This simplification is likely to have impacted the results. Ultimately, the pandemic underscored the need for industry-specific aid strategies.

Construction, with its dual response in profitability and employment, could benefit from continued robust support in future crises. Wholesale might prioritize stability-focused aid to maintain profitability, while Manufacturing may need tailored assistance to address its diverse operational needs.

8.1.3 Profitability Differences in the Effects of State Aid

In addition to examining the regional and industry-specific impacts of COVID-19 state aid, it is also insightful to analyze how companies with varying levels of pre-pandemic profitability responded to this financial support. Grouping the data into low-margin, medium-margin, and high-margin companies highlights differences in the effectiveness of aid across these groups, offering valuable insights into how pre-existing financial health influenced the impact of state intervention during the pandemic.

Country (Region)	Spain (low margin)	Spain (medium margin)	Spain (high margin)
log Number of Emoloyees	0,230	0,015***	0,014**
	(0,240)	(0,007)	(0,011)
log profit per Employee	0,024	-0,030***	-0,027***
	(0,441)	(0,002)	(0,006)
log Proftit Margin	0,000	-0,029***	-0,010
	(0,993)	(0,000)	(0,193)
log gross Profit	0,031*	0,010**	0,002
	(0,072)	(0,026)	(0,708)
Ebit Margin IHS	0,007	0,002	-0,013**
	(0,723)	(0,724)	(0,037)
Sample Size (N=)	16 555	205 111	202 083

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8: Average treatment effect of firms that received state aid in 2020. Shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The table shows the differences in the effectiveness of state aid in Spain based on 2019 profit/performance margins

For low-margin companies, state aid shows significant effects on log gross Profit (0.031*), indicating that these firms, which likely had weaker financial reserves and a limited capacity to withstand prolonged revenue drops, used the aid primarily to support profitability. However,

the other metrics, including log Number of Employees and Ebit Margin (IHS), are not statistically significant, suggesting that aid in this group may not have translated into growth or operational efficiency improvements but instead acted as a financial lifeline. This suggests that low-margin companies focused on survival rather than expansion, using aid to stabilize core financials rather than pursue growth-oriented strategies. The limited impact on employment in this group may reflect the constrained flexibility of low-margin firms, which may have struggled to retain staff or invest in new hires irrespective of receiving aid.

Medium-margin companies show several statistically significant responses to state aid, highlighting a more diversified use of support during the pandemic. The coefficient for the log Number of Employees is 0.015***, suggesting that these companies were able to leverage state aid to maintain or even increase their workforce. Additionally, log profit per Employee (-0.030***) and log Profit Margin (-0.029***) show significant, albeit negative, relationships with state aid. This suggests that while aid may have helped retain or grow employment levels, it might have come at the cost of per-employee profitability and profit margins, possibly due to increased labor costs or inefficiencies introduced during the time of crisis. Medium-margin companies may have been trying to balance short-term stability with long-term recovery, using aid to keep operations running smoothly and avoid layoffs, even if it meant temporarily sacrificing efficiency and profitability metrics. This pattern implies that medium-margin companies were in a more flexible position than low-margin firms, enabling them to invest in human resources and retain employees, even if it led to decreased profitability per employee. For policymakers, this group could represent a key target for future crisis support, as these companies' showed resilience and used aid to preserve employment despite the pressures on profitability.

High-margin companies, which entered the pandemic with the strongest profitability, show significant effects of state aid on log Number of Employees (0.014**) and Ebit Margin (IHS)

(-0.013**). The positive effect on employment indicates that these firms used aid to expand or retain their workforce, leveraging their stronger financial foundation to focus on long-term stability and possibly even growth. However, the negative effect on the EBIT margin (IHS) suggests a slight reduction in operating efficiency or profitability during the crisis, potentially due to increased costs associated with sustaining employment levels or adapting business practices in response to the pandemic. Notably, the log profit per Employee variable also shows a negative and statistically significant coefficient (-0.027***), indicating that while employment numbers increased, the profitability generated by each employee may have decreased. This might reflect a strategic decision by high-margin firms to absorb short-term costs related to workforce expansion or adaptation expenses, aiming for a recovery-focused approach that prioritizes employment and long-term resilience over immediate profitability.

The analysis by pre-pandemic profitability highlights the varied impact of state aid across different financial health groups. Low-margin companies used aid largely to stabilize profitability without significant gains in employment or efficiency, reflecting a survival-oriented approach. Medium-margin firms appear to have prioritized employment retention but faced trade-offs in per-employee profitability, possibly as they adjusted to new operational challenges. High-margin companies with greater financial flexibility balanced employment growth with a reduction in per-employee profitability, indicating an adaptive strategy that prioritizes workforce stability over immediate returns. These findings suggest that pre-existing profitability levels play a significant role in determining how companies utilize state aid. For policymakers, this underscores the value of targeting aid according to firms' financial health. For instance, future aid could include additional flexibility and support for low-margin companies that need stronger stabilization measures, while medium- and high-margin companies might benefit from employment-focused aid programs designed to maximize job retention and support workforce growth during crises.

8.1.4 Impacts on Employment

One of the main objectives of state aid through the Temporary Framework was to prevent job losses in heavily impacted sectors. The analysis shows that the employment effects of pandemic-related aid varied significantly across regions and industries, highlighting the need for targeted employment-focused support during crises.

In the Construction sector, state aid played a significant role in preserving and potentially growing jobs, as seen in the log Number of employees (0.057***). Construction, which relies heavily on a skilled workforce, faced challenges with labor retention during lockdowns and project delays. State aid enabled construction firms to continue paying employees and resume projects once restrictions eased, preventing large-scale job losses in this critical sector. The Construction sector's relatively high employment responsiveness suggests that in crisis periods, state aid can be particularly effective in sectors that rely on large, project-based workforces.

At a regional level, the Centre also saw significant employment benefits from COVID-19 aid, with a positive impact on the log Number of employees (0.024***). The Centre region also includes the city of Madrid's economy. This economic powerhouse shows a high concentration of service and capital-intensive businesses. Due to its high population, it also experienced severe disruption during the pandemic, and state aid likely played a role in helping smaller firms retain employees amidst uncertainty. The effectiveness of pandemic aid in supporting employment in Centre/Madrid suggests that urban regions with dense business networks may respond well to employment-focused aid during crises, as such regions face intense economic pressures and are critical for overall economic recovery.

However, regions like the South showed limited employment impacts from pandemic aid, with results pointing more toward profitability stabilization. In economically vulnerable areas, aid focused on maintaining business profitability rather than expanding employment may have

been more appropriate during the pandemic. This suggests that in regions facing both economic and structural challenges, separate programs specifically designed for job creation may be necessary to support longer-term employment goals. In summary, the pandemic-era state aid in Spain had the strongest employment impact in labor-intensive sectors like construction and in urban regions like Madrid. Policymakers might consider enhancing employment-focused aid in these areas during future crises, where state support can have a significant multiplier effect on local economies.

8.2 Policy Implications/Recommendations

The results of this study indicate several key policy recommendations for improving the effectiveness of state aid in Spain during times of crisis. First, the regional disparities in the impact of pandemic aid show the importance of a regionally tailored approach. For instance, in the North, where turnover was more responsive to aid, future crisis-related support could emphasize activities that promote revenue, such as market expansion and sales support. Meanwhile, in Madrid, where asset growth was a focus, aid might prioritize helping firms build resilience through capital investment.

Industry-specific findings also highlight the value of tailoring aid to sectoral needs. For example, since the Construction sector showed significant positive effects on both profitability and employment, directing larger shares of aid to construction during crises could address both economic stability and job preservation. By contrast, Wholesale could benefit from aid that focuses on operational stability and efficiency rather than direct job support, as the sector's employment needs were less responsive to state aid during the pandemic. The limited impact of COVID-19 aid in the Manufacturing sector suggests that financial relief alone may not be sufficient for this diverse industry during crises. Complementary policies, such as support for digital transformation or improvements to supply chain resilience, may amplify the effects of aid. By adopting a more nuanced, data-driven approach to crisis-era state aid, Spanish

policymakers can better support resilience and economic recovery, ensuring that public resources are directed to where they can make the most substantial impact.

Overall, these recommendations stress the importance of adaptive, crisis-responsive state aid policies that align with the unique economic characteristics of each region and industry. In times of crisis, such as the COVID-19 pandemic, region- and sector-specific aid can be instrumental in bolstering resilience and paving the way for recovery across Spain's diverse economic landscape.

8.3 Comparison with Italy

Both Italy and Spain experienced regional disparities in the effectiveness of state aid. In Italy, aid was most effective in the northern regions, which benefited from better infrastructure and industrial activity. For instance, turnover for firms receiving aid increased by 8.5% in the north compared to 6.0% in the south (Langewald, 2024). Spanish regions such as the North and Center showed mixed outcomes. While the North recorded significant increases in turnover (+0.039***), the South prioritized profitability improvements with a rise in profit margins (+0.070***).

The higher concentration of industrial sectors in Northern Italy provided a foundation for leveraging state aid more effectively (Langewald, 2024). In Spain, however, the reliance on profitability in the South, a more tourism-dependent area, reflected a survival-oriented approach during the pandemic, aligning with regional economic characteristics.

Italy and Spain exhibited notable sectoral differences in the utilization of state aid. In Italy, manufacturing benefitted the most, showing gains in employment and profitability metrics, followed by construction and wholesale. Construction saw employment increase by +0.092***, caused by its labor-intensive nature (Langewald, 2024).

Spain, on the other hand, showcased a varied sectoral impact. The construction sector saw improvements in gross profit (+0.050***) and employment (+0.057***), being equal to Italy's

results. However, the wholesale sector in Spain primarily focused on operational efficiency, with state aid contributing to increased profit margins (+0.029***) but not significantly affecting employment levels. Manufacturing in Spain showed limited effects, suggesting a need for more targeted support.

At the firm level, differences between the two countries emerged in the scale and focus of aid effects. Italian firms benefitted broadly across metrics such as turnover and profit margins, with high-margin firms leveraging aid for growth and employment retention. In Spain, pre-existing profitability significantly influenced outcomes. Low-margin firms utilized aid as a financial lifeline, stabilizing core financials without significant employment gains. Medium-margin firms balanced employment retention with reduced profitability, while high-margin firms prioritized workforce expansion over immediate efficiency.

Italy spent significantly more on state aid during the pandemic, with expenditures totaling €69.14 billion, compared to Spain's €13.79 billion. When measured as a percentage of GDP, Italy allocated more resources, resulting in more diversified impacts across industries and regions (Langewald, 2024). In contrast, Spain's lower expenditure and concentration on specific outcomes like profitability in the South underscore a more constrained approach.

Looking at the differences in the outcomes of the two countries the importance of tailored state aid measures to regional and sectoral needs becomes very clear. Italy’s comprehensive allocation enabled robust support across industries and regions, while Spain’s targeted measures reflected constrained fiscal capacity but allowed specific regions and sectors to stabilize during the crisis. Future aid strategies should consider regional economic structures and pre-existing financial health to maximize impact.

9. Limitations

The analysis is segmented by geographic regions (using NUTS1 classifications) and sectors (e.g., manufacturing, construction, wholesale/retail). This segmentation is essential in

understanding the heterogeneous impact of COVID-19 across regions and sectors, as different areas and industries faced varied challenges during the pandemic. The regional and sectoral breakdown helps capture the pandemic's differentiated effects, which are critical for designing targeted policy interventions. However, a more accurate practice could include one or multiple interaction terms between region, sector, and treatment variables to explore whether treatment effects differ significantly by location or industry. This would allow for more granular insights, identifying specific sectors or regions where interventions were more or less effective. While this would offer a clearer picture of the policy's differential impact, it also extends beyond the scope of this paper, as the complexity of the applied model would increase substantially.

Looking forward, an extension to the performed analysis could be made by expanding the used multi-level modeling or random slopes in the fixed-effects model to allow for more diverse variation in treatment effects across regions or sectors. This approach would be particularly useful in isolating the effect of localized factors, such as regional differences in infrastructure or sectoral exposure to lockdown measures, which may have influenced how different areas or industries responded to the pandemic. Moreover, this analysis aggregates treatment effects across the period defined as "after," consisting of data available for 2021 and 2022. A more comprehensive and nuanced analysis might distinguish between the effects for each respective year. This temporal breakdown would help to track how the recovery trajectory evolved, particularly given the changing nature of government interventions, vaccination rollouts, and recurring waves of infection.

The impact of COVID-19 and subsequent policy interventions likely varied not only by region and sector but also by the size of firms within those sectors. For example, small and medium-sized enterprises (SMEs) may have faced different challenges compared to large corporations. SMEs are often more vulnerable to economic shocks due to limited access to credit, less diversified supply chains, and lower levels of digitalization. On the other hand, larger firms,

while potentially more resilient, could have experienced significant disruptions due to their larger workforce or global supply chain dependencies.

Separating the data by firm size before the conduction of the analysis could be done by stratifying the data into different firm size categories (e.g., micro, small, medium, large) and examining how the treatment effects vary across these groups (Canzian et. al, 2024). A potential approach is to introduce interaction terms between firm size, region, and sector in the regression models, allowing for an exploration of how the combined effects of geography, industry, and firm size shape the outcomes. Another option is to apply multi-level modeling, where firm size is treated as another hierarchical level, to capture cross-firm size variation in treatment effects. This would help to reveal whether smaller firms, for example, in the construction sector in a specific region, experienced more severe or less pronounced impacts compared to larger firms in the same sector and region.

The study employs logarithmic transformations for some variables, such as turnover, gross profit, and employee numbers, to address issues of skewness and heteroscedasticity in the dataset. However, this approach introduces potential biases, particularly when interpreting the results for firms with very low or zero values in the original scale. Logarithmic transformations require either excluding or modifying these zero values, which may distort the true distribution of the data and affect the results for smaller firms. Furthermore, the interpretation of percentage changes implied by logarithmic coefficients may not align with the actual changes observed in the raw data. To mitigate these biases, future analyses could explore alternative data transformations or employ nonlinear modeling techniques that preserve the integrity of the original scale while addressing statistical challenges.

While the study provides a robust evaluation of state aid's impact on company performance, it does not include a cost-benefit analysis to directly measure the return on investment (ROI) in terms of retained jobs. Such an analysis would require detailed information on the total financial magnitude of state aid allocated to each firm, paired with specific employment metrics before

and after intervention. Despite the availability of firm-level financial data, the lack of granular information on the exact usage of aid funds and the costs associated with preserving individual jobs makes conducting a precise ROI calculation challenging. This omission limits the ability to quantify the economic efficiency of state aid programs fully. Future research could address this gap by integrating data on state aid disbursements with employment cost structures at the firm level, enabling a more comprehensive cost-benefit analysis.

Ultimately, addressing firm size would allow for a deeper understanding of policy efficiency. Different policy measures, such as wage subsidies, tax deferrals, or direct grants, may have been more effective for certain firm sizes. Including firm size in the analysis would provide insights into whether these interventions had the intended effect of supporting smaller businesses, which typically lack the financial buffers that larger firms have available. This could inform future policy recommendations, ensuring that any new measures consider the distinct needs of firms based on their size. Furthermore, distinguishing between firm size categories over time could highlight whether the recovery was equitable across different business sizes. For instance, SMEs may have taken longer to recover from the economic downturn than larger firms, which could influence the overall assessment of the policy's effectiveness in fostering a comprehensive recovery across regions, sectors, and different firm sizes.

10. Conclusion:

This thesis set out to examine the impact of state aid during the COVID-19 pandemic on firm performance and employment in Spain, using the European Union's Temporary Framework (TF) as a guiding context. By analyzing regional, sectoral, and firm-level differences, this study aimed to uncover how the design and distribution of aid influenced outcomes and to provide insights for future policymaking.

The TF, introduced by the European Commission, was pivotal in enabling member states to respond swiftly to the economic challenges posed by the pandemic. By temporarily relaxing competition rules under Article 107(3)(b) of the TFEU, the TF allowed for unprecedented financial interventions while maintaining oversight to prevent market distortions. In Spain, the TF facilitated a variety of aid measures, including direct grants, guarantees, and loans, which proved crucial in mitigating the economic fallout. However, disparities in fiscal capacity among EU member states became evident, with Spain allocating €13.79 billion in aid compared to Italy's €69.14 billion. These differences highlight the challenges of ensuring equitable support across the Union, where wealthier states can provide more extensive aid.

The findings reveal that state aid had varied impacts across regions and sectors. In Northern Spain, a 3.9% increase in turnover highlighted the region's capacity to leverage aid for revenue stabilization, while in the Centre, particularly Madrid, a 7.4% growth in total assets underscored the importance of financial resilience in economic hubs. Conversely, the South focused on profitability, with businesses achieving a 7.0% improvement in profit margins, reflecting a survival-oriented approach to aid. These regional differences underscore the importance of tailoring aid to local economic conditions, ensuring that resources address the unique challenges faced by each area.

Sectoral analysis revealed similarly nuanced results. The Construction sector experienced a (+5.7%) increase in employment and a (+5.0%) rise in gross profit, demonstrating the dual role of aid in preserving jobs and enhancing profitability in labor-intensive industries. In contrast, the Wholesale sector used aid to stabilize operations, achieving a (+2.9%) improvement in profit margins but showing limited employment effects. The Manufacturing sector, with its diverse sub-industries, exhibited minimal statistically significant results, highlighting the need for targeted interventions that address specific sectoral needs, such as digital transformation or supply chain resilience.

At the firm level, pre-existing financial health played a critical role in determining the effectiveness of aid. Low-margin firms primarily used aid to stabilize operations without significant employment gains, while medium-margin firms balanced workforce retention with reduced profitability. High-margin firms expanded their workforce, albeit at the cost of slight declines in operating efficiency. These findings suggest that future aid strategies should consider firms' financial characteristics to optimize resource allocation and maximize impact.

The results of this study emphasize the importance of targeted, regionally, and sectorally adaptive aid policies. Regional tailoring is essential; for example, turnover-focused strategies may be more effective in Northern Spain, while profitability-focused approaches suit areas like the South. Industry-specific measures are also critical, as seen in the Construction sector's need for job preservation schemes and the Manufacturing sector's requirement for targeted support to address structural challenges. Furthermore, firm-level targeting based on financial health can enhance aid effectiveness, with low-margin firms requiring stabilization measures and high-margin firms benefiting from employment-focused aid. The success in maintaining employment is consistent with previous studies highlighting the role of government intervention in stabilizing labor markets during crises (Boeri and Bruecker 2011; Cahuc and Carcillo 2011). However, the uneven distribution of employment gains suggests that additional measures, such as targeted labor market programs in underperforming regions and sectors, could increase the overall impact. In conclusion, the COVID-19 pandemic tested the resilience of economies worldwide, and Spain's experience under the TF offers valuable lessons. While state aid helped stabilize vulnerable sectors and safeguard employment, disparities in its distribution and effectiveness underline the need for a more nuanced and equitable approach. By learning from these experiences, policymakers can better prepare for future crises, ensuring that aid reaches those who need it most and fostering a more resilient and inclusive economic recovery.

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Appendix:

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Legislative Changes to the TFEU in Spain

Date	Scheme Description	Sector(s) Affected	Aid Type	Budget in billion €
24.03.20	Guarantee schemes for new loans and refinancing operations for self-employed and companies	Self-employed, SMEs, larger companies	Loan guarantees	20
02.04.20	National Temporary Framework for State aid to support the Spanish economy	Self-employed, SMEs, large companies	Grants, loans, tax advantages	N/A
24.04.20	Second Spanish umbrella scheme providing aid for coronavirus-related research, wage subsidies, and more	Research, SMEs, large companies	Grants, tax deferrals, wage subsidies	N/A
31.07.20	Solvency Support Fund to invest in companies affected by COVID-19	Strategic enterprises in Spain	Debt and recapitalisation	10
06.08.20	Amendments to Spanish guarantee schemes, increasing budgetary allocation by €40 billion	Companies, self-employed	Loan guarantees	40

23.11.20	Compensation scheme for self-employed and companies for damages suffered due to COVID-19	Self-employed, companies	Public guarantees on loans	2.55
07.12.20	Reinsurance scheme to support trade credit insurance market	Trade	Public reinsurance guarantee	0.5
14.12.20	Modification of loan guarantee scheme with an extension of terms for existing guaranteed loans	Companies, self-employed	Loan guarantees	N/A
22.02.21	Modification of an existing umbrella scheme for support through direct grants, tax and payment advantages, and loans	All sectors (except financial)	Direct grants, tax advantages, guarantees, loans, equity	N/A
19.07.21	Recapitalisation fund to support companies affected by COVID-19	All sectors (except financial)	Debt and equity instruments	1
22.07.21	Compensation for Air Nostrum airline for damages due to COVID-19 travel restrictions	Aviation	Direct grants	0.09
Source: Details of Spain's support measures to help citizens and companies during the significant economic impact of the coronavirus pandemic.				

Table 1: Legislative Changes to the TFEU in Spain

Italy´s support measures during Covid:

The onset of the COVID-19 pandemic triggered extraordinary economic disruption globally, and Italy, being one of the hardest-hit countries in Europe, responded with a comprehensive collection of state aid measures to mitigate the crisis. These initiatives were designed to support businesses across various sectors, safeguard employment, and ensure economic stability in the face of severe liquidity shortages, business closures, and reduced economic activity. In response, the European Commission allowed Italy to implement major state aid schemes during the pandemic.

Italy's state aid measures were introduced under the European Union's TF for state aid rules, allowing for rapid and flexible financial support to businesses and citizens impacted by the pandemic. The overarching aim was to address liquidity issues, maintain employment levels, and enable businesses to adapt to the evolving economic environment. (Commission N/A)

Legislative Changes to the TFEU in Italy

Date	Scheme Description	Sector(s) Affected	Aid Type	Budget in billion €
21.04.20	Support for agricultural businesses in Friuli Venezia Giulia	Agriculture, Forestry, Fishery	Direct grants, favorable loans	0.05
26.06.20	Waiver of regional tax on production and exemption from municipal tax for touristic properties	Tourism, Commercial Properties	Tax exemptions	7,60
13.08.20	Trade credit insurance for companies facing non-payment risks	Trade	State guarantee scheme	2,00
19.08.20	Support for sports associations and amateur entities	Sports, Amateur Associations	State guarantees on loans	0.0016
04.12.20	Support for businesses in historic city centers affected by the pandemic	Tourism, Commerce	Direct grants	€0.5
01.02.21	Support for companies managing aluminum waste sorting and recycling plants	Waste Management	Direct grants	0.01
24.02.21	Exemption from social security contributions for private employers	Employment	Social security exemption	0.0614
02.03.21	Compensation for Toscana Aeroporti (Pisa and Florence airports)	Aviation	Direct grants	0.01
09.07.21	Aid for tour operators and travel agents affected by the pandemic	Tourism, Travel	Direct grants	0.625
12.07.21	Incentives for hiring unemployed workers	Employment	Social security exemptions	0.878
02.08.21	Support for tourism, spas, commerce sectors (reduction of labor costs)	Tourism, Spas, Commerce	Social security exemptions	0.868
17.09.21	Incentives for hiring young workforce	Employment	Social security exemptions	1,24
17.09.21	Support for large enterprises facing revenue reduction	Large Enterprises	Direct grants, tax advantages	44,00

28.10.21	Incentives for hiring female workers	Employment	Social security exemptions	0.0969
05.11.21	Support for bus operators affected by the pandemic	Transport	Compensation for loan repayment	0.073
10.11.21	Support for companies in the textile, fashion, and accessories sectors	Fashion, Textile	Tax credit	0.245
30.11.21	Support for SMEs engaged in international activities relevant to green and digital transitions	SMEs, Green, Digital	Direct grants, subsidized loans	0.4
15.12.21	Support for entertainment agencies and tourist villages	Entertainment, Tourism	Direct grants	0.01
18.01.22	Umbrella scheme to support businesses facing income loss and liquidity shortages	All sectors (except financial)	Direct grants	15,00
28.01.22	Renewal scheme for agriculture, forestry, fishery, and aquaculture	Agriculture, Forestry, Fishery, Aquaculture	Direct grants, tax advantages	1,70

Source: European Commission - Details of Italy's support measures to help citizens and companies during the significant economic impact of the coronavirus pandemic

Table 9: Legislative Changes to the TFEU in Italy

State Aid Expenditure:

Figure 2.1 shows that remedy for serious economic disturbance is the second most used reasoning for aid expenditure. This indicates the seriousness of the Covid 19 Crisis. The temporary framework allowed countries to provide almost as much aid to battle the implications of lockdowns as for environmental protection.

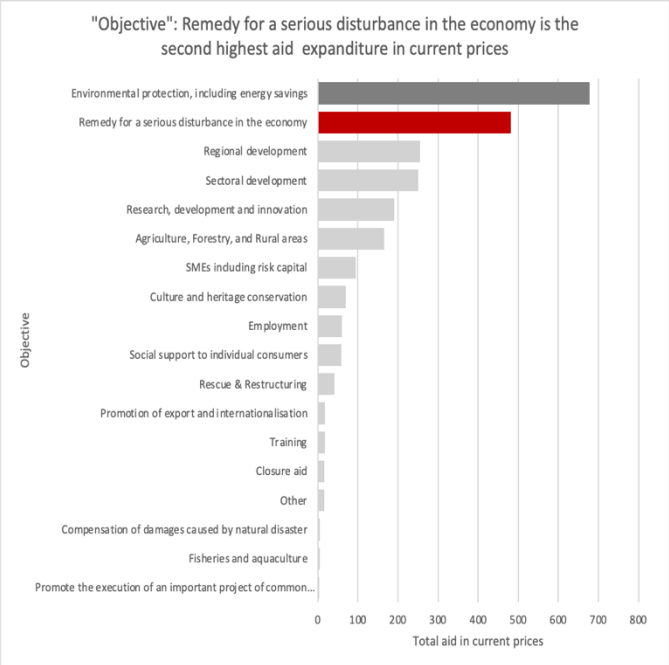


Figure 2.1: Prominence of objectives “Total Aid” is being used for.

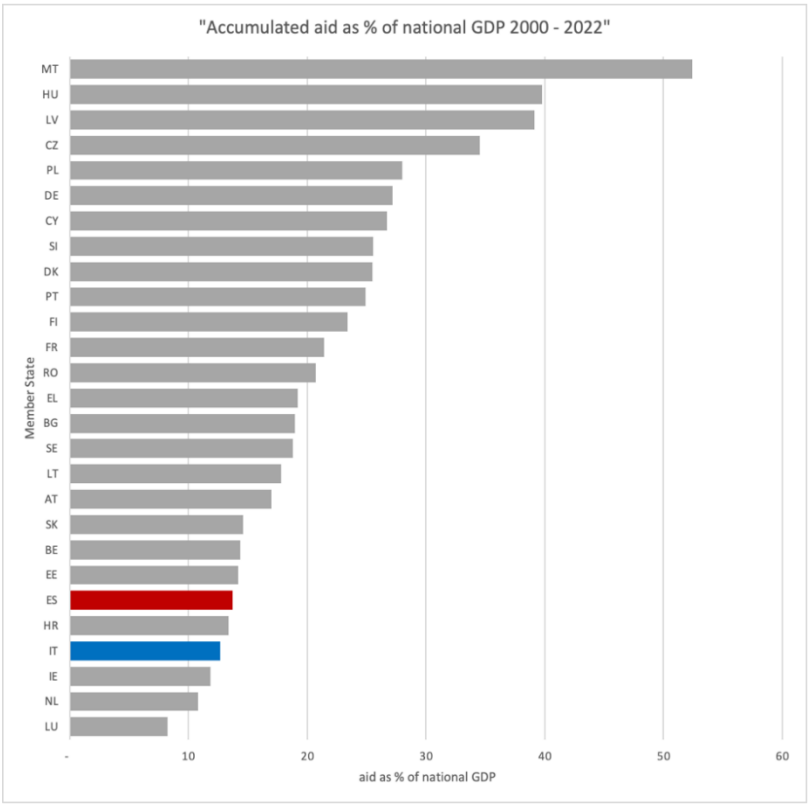


Figure 2.2: - international comparison of Accumulated aid as % of annual GDP during the past two decades.

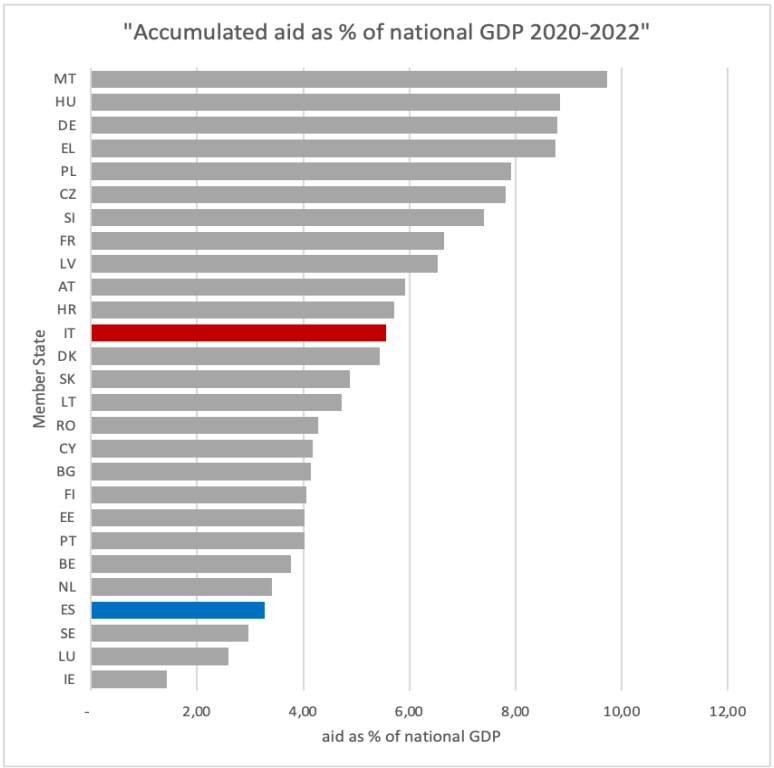


Figure 2.3 – International comparison x of Accumulated aid as % of annual GDP during pandemic years.

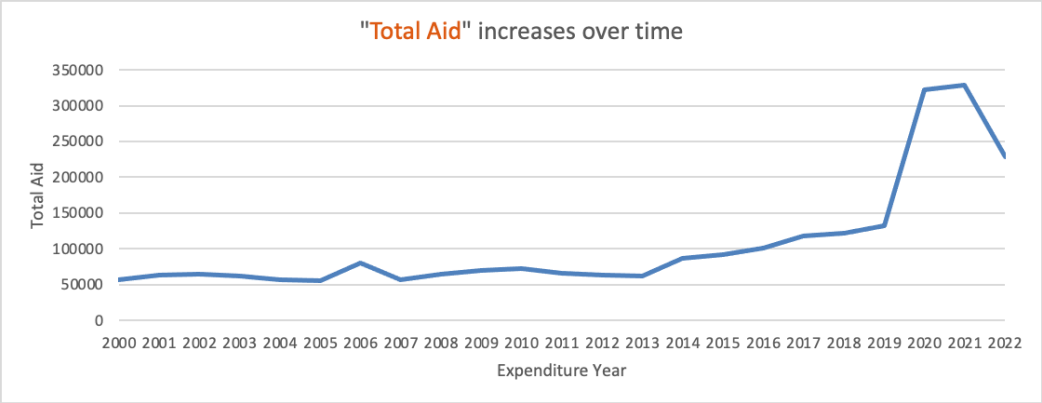


Figure 7.1 – Longitudinal developments of state aid expenditures? In Millions - For EU countries.

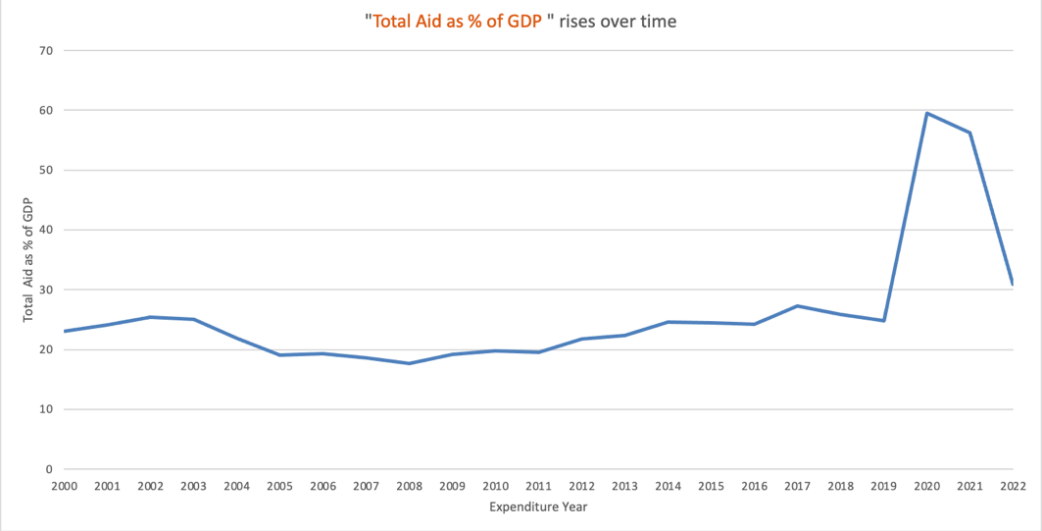


Figure 7.2 – Longitudinal developments of state aid expenditures as % of GDP for EU countries.

Descriptive Data (Spain):

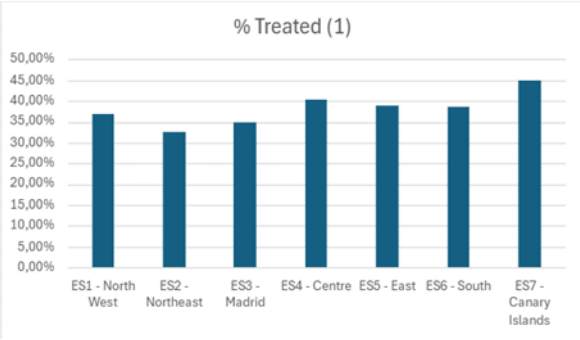


Figure 4: Regional Breakdown of State Aid in Spain in relative numbers

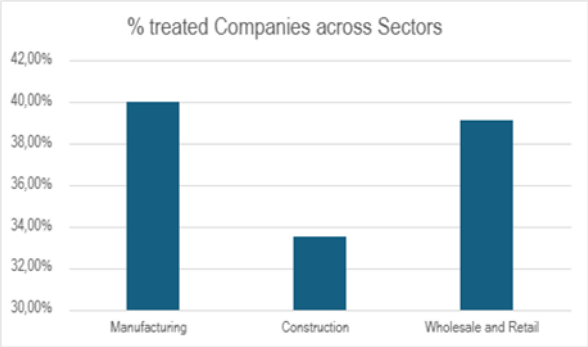


Figure 5: Relative number of Covid-Support beneficiaries in Spain for each industry.

A comparison of financial indicators between firms that received aid (treated) and those that did not (non-treated) shows that treated firms initially had higher median financial values. Over time, the financial performance of treated and non-treated firms began to converge, suggesting that the aid mitigated financial disparity. This alignment suggests that state aid played a role in stabilizing businesses that were most vulnerable to pandemic-induced challenges, enabling many firms to sustain operations. Furthermore, it illustrates the requirements for receiving aid as by the Temporary Framework. Covid-19 support funds were designed to support vulnerable businesses, rather than keeping previously struggling firms financially afloat. This might explain why aided firms at times show for stronger initial financial indicators than their non-treated counterparts.

Descriptive Data (Italy):

Italy 2019	Treated					Non-Treated				
Financial Variables	**Mean**	**Median**	**SD**	**Min**	**Max**	**Mean**	**Median**	**SD**	**Min**	**Max**
Turnover (€M)	2,896	0,476	106,705	0,001	24.945,750	4,304	0,322	157,725	0,000	30669,620
Loans (€M)	0,111	0,000	1,730	0,000	280,060	0,274	0,000	21,060	0,000	4366,536
Total Assets (€M)	2,050	0,385	36,135	0,001	8.011,684	3,980	0,313	89,365	0,000	10467,750
Capital (€M)	0,123	0,010	2,702	0,000	469,960	0,366	0,010	10,965	0,000	1904,375
EBITD margin	5,389	3,860	13,235	-99,92	97,270	0,286	2,470	21,910	-99,93	99,270
Performance Variables	**Mean**	**Median**	**SD**	**Min**	**Max**	**Mean**	**Median**	**SD**	**Min**	**Max**
log_grossprofit	12,453	12,430	1,322	3,850	22,707	12,130	12,076	1,531	0,693	22,162
log_profitperemployee	2,016	1,946	1,337	0,000	9,092	2,095	2,079	1,425	0,000	8,936
log_profitmargin	1,332	1,426	1,321	-4,605	4,579	1,434	1,581	1,455	-4,60517	4,597
Observations (N=)	124.086									

Table 10. Financial and performance firm characteristics in the year 2019, distinguished by firms that received state aid and firms that did not receive state aid in Italy.

In Italy, significant differences can be seen between treated and non-treated firms across multiple financial variables. Non-treated firms show a higher mean turnover (€4.304M) than treated firms (€2.896M). However, the turnover medians (treated: €0.476M; non-treated: €0.322M) suggest that treated firms are generally smaller, with fewer outliers pushing up their mean turnover. The large standard deviation (SD) and maximum values for non-treated firms indicate that this group includes firms with substantially higher turnovers, contributing to the inflated mean. Looking at loans, treated firms in Italy carry significantly less debt, with a mean of €0.111M, compared to €0.274M for non-treated firms. A zero median for loans among treated firms indicates that a substantial portion of these firms operate without debt, whereas non-treated firms tend to engage in higher borrowing. Total assets and capital also follow a similar trend: non-treated firms report higher means in both categories (€3.980M and €0.366M) compared to treated firms (€2.050M and €0.123M). These findings suggest that non-treated firms are larger and better capitalized, potentially benefiting from greater financial stability. Interestingly, treated firms demonstrate a substantially higher EBITD margin, with a mean of 5.389%, compared to only 0.286% for non-treated firms. Despite this apparent advantage, the large standard deviation and extreme minimum values for the treated group indicate significant variability, which could signal performance volatility among these firms. (Table 10)

In terms of performance variables, both groups exhibit similar log_grossprofit levels, although treated firms show a slightly higher mean. On the other hand, log_profitperemployee and log_profitmargin are slightly higher in non-treated firms, indicating a slight efficiency advantage in profitability for non-treated firms. (Table 10)

In Italy, a total of 954,919 companies were investigated, with the majority consisting of micro and small enterprises. Of these companies, 55.22% received state aid to mitigate the economic impact of the Covid-19 pandemic. Table 11 below highlights that large and medium-sized firms received proportionally less state aid compared to their smaller counterparts.

Number of Employees Grouped	Not Treated (0)	Treated (1)	Total	% Not Treated	% Treated	% Total
0-1	291715	323169	614884	47,44%	52,56%	100,00%
2-5	75482	124211	199693	37,80%	62,20%	100,00%
6-10	37668	56068	93736	40,19%	59,81%	100,00%
11-20	15647	17097	32744	47,79%	52,21%	100,00%
21-50	5989	5663	11652	51,40%	48,60%	100,00%
51-250	671	661	1332	50,38%	49,62%	100,00%
251-500	331	296	627	52,79%	47,21%	100,00%
501-1000	148	103	251	58,96%	41,04%	100,00%
Total	427651	527268	954919	44,78%	55,22%	100,00%

Table 11: State Aid Recipients in Italy by Company Size in relative and total numbers.

During the first year of the pandemic, Italy provided state aid to a limited number of firms, with only about 30% receiving assistance by the end of 2020. By the end of 2021, nearly 60% of companies had benefitted from state aid. However, in 2022, the number of firms receiving state support began to decline gradually (see Figure 8). The high influx of companies that received aid in q8 could be the result of the € 44 Billion rescue package released in September 2021 by the Italian government on September 17th, 2021 (The Commission N/A)

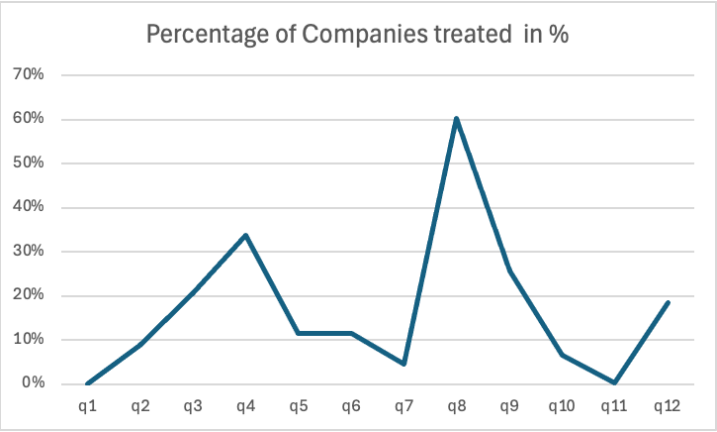


Figure 8: Relative number of companies that received Covid-Support between Q1 2020 – Q4 2022 in Italy

When examining regional variations, the northern regions of Italy saw nearly 60% of companies receiving support, while in the southern regions and on the islands, more than 10% fewer businesses benefitted from government aid. The central regions fell between these two extremes

(see Figure 9). Across different sectors, including manufacturing, construction, and wholesale, state aid was distributed relatively evenly, with between 54% and 57% of firms in each sector receiving support (see Figure 9).

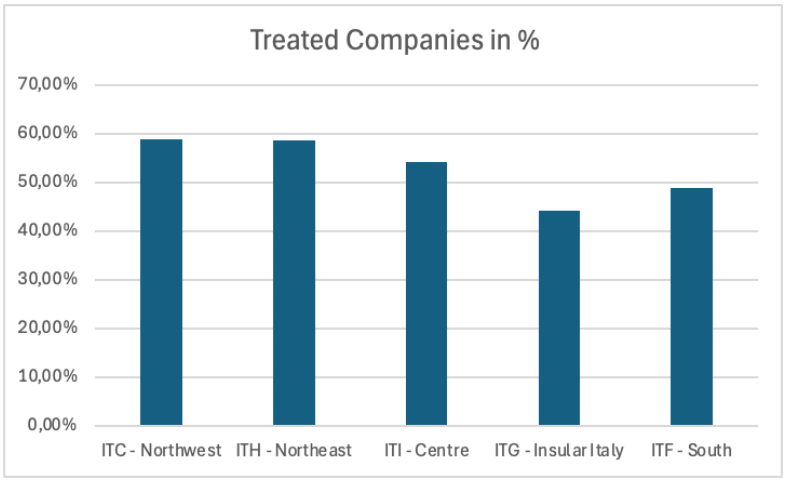


Figure 9: Regional Breakdown of Covid-Support across Italy in relative numbers

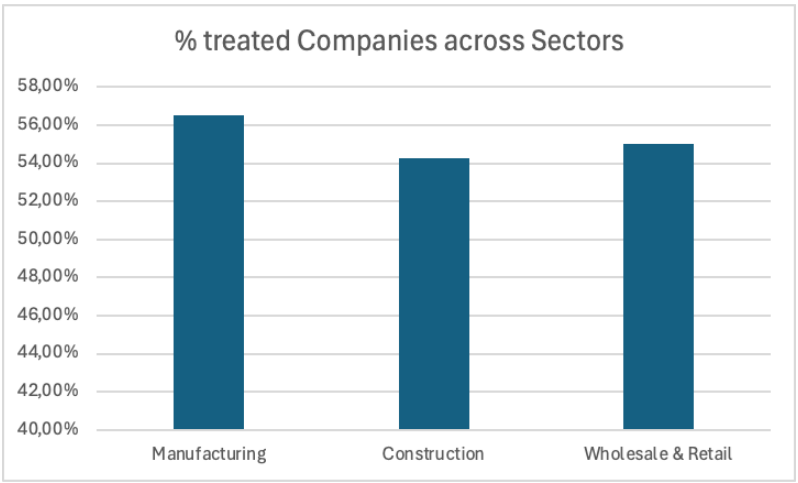


Figure 10: Industry Breakdown of Covid-Support in Italy in relative numbers

Comparing financial metrics between firms that received state aid (treated) and those that did not (non-treated), it becomes evident that the median values for treated firms were initially higher. Interestingly, after receiving aid, the financial performance of treated and non-treated firms became more similar (see Figures 11.1, 11.2, and 11.3). A similar trend emerged when

analyzing firm performance: before treatment, non-treated firms performed significantly worse than treated firms, but post-treatment, performance levels between the two groups converged (see Figures 11.4, 11.5, and 11.6). This suggests that many underperforming firms that did not receive state aid were unable to survive the pandemic or ceased reporting data to the Orbis dataset.

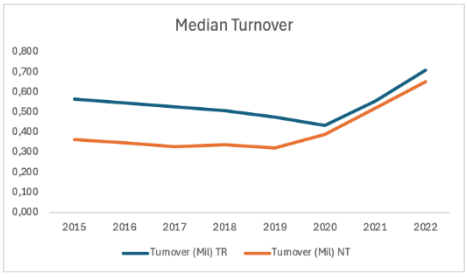


Figure 11.1: Median Turnover

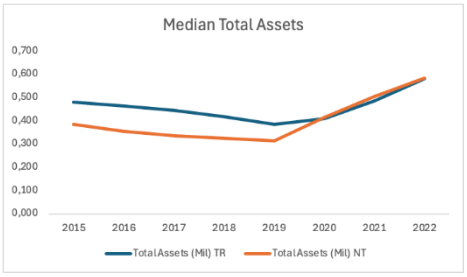


Figure 11.2: Median Total Assets

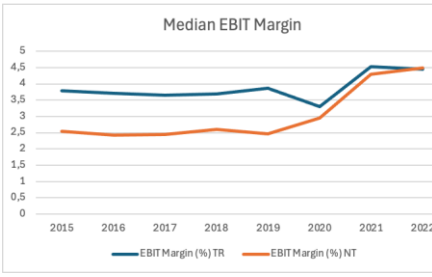


Figure 11.3: Median EBIT Margin

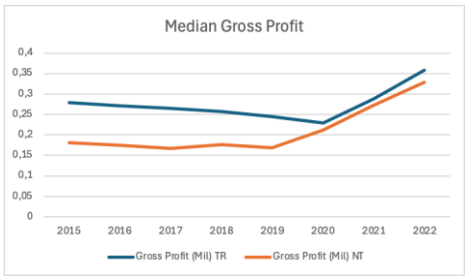


Figure 11.4: Median Gross Profit

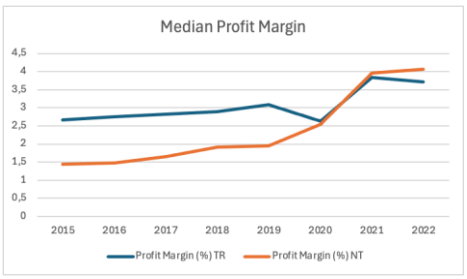


Figure 11.5: Median Profit Margin

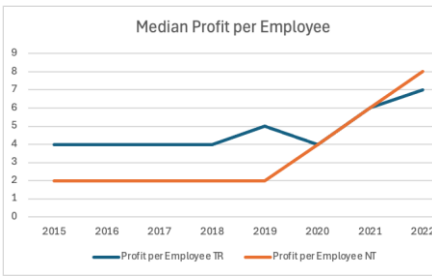


Figure 11.6: Median Profit per Employee

Figure 11: Shows the median values for firm performance variables between 2015 and 2022 and distinguishes between companies that received state aid in 2020 and companies that did not receive state aid in 2020.

When comparing Italy and Spain, notable differences emerge between the two countries. Treated firms in Italy report a higher mean turnover (€2.896M) than those in Spain (€1.815M). The median turnover values are more closely aligned, suggesting that the higher mean in Italy is driven by a small number of large firms with outsized turnovers. In terms of loans, Spanish treated firms exhibit greater reliance on debt financing, with a mean of €0.167M compared to €0.111M in Italy. This suggests a potentially more risk-tolerant financial structure in Spain's treated firms. Italian treated firms also have higher total assets (€2.050M vs. €1.344M in Spain) and slightly more capital (€0.123M vs. €0.102M). However, the most striking difference lies in the EBITD margin, where Italian treated firms boast a significantly higher mean (5.389%)

compared to their Spanish counterparts (2.672%). This suggests that, on average, Italian treated firms may achieve better operational profitability, though the greater variability in the Italian data indicates a more heterogeneous performance distribution. (Table 10 & 11)

In terms of the analyzed performance variables, Italian treated firms perform better than their Spanish counterparts. Both log_grossprofit and log_profitperemployee are higher in Italy, indicating stronger profitability and efficiency. Log_profitmargin is also higher for Italian firms (1.332 vs. 0.831), further supporting the conclusion that Italian treated firms demonstrate better financial performance relative to Spain, which can be explained by the more generous state-aid policy in Italy. (Table 10 & 11)

For non-treated firms, the longitudinal trends of the variables are largely consistent with those observed for treated firms. Italian non-treated firms report higher mean turnover (€4.304M) than Spanish non-treated firms (€2.981M). In terms of loans, Italian non-treated firms appear to engage in significantly more borrowing (€0.274M) than their Spanish counterparts (€0.076M), a contrast to the situation with treated firms where Spanish firms had higher loans. In addition, Italian non-treated firms report higher total assets (€3.980M) and capital (€0.366M) compared to Spanish non-treated firms (€2.611M and €0.327M, respectively), suggesting that Italian non-treated firms are larger and better capitalized. (Table 2. & 3.)

However, Spanish non-treated firms exhibit a higher EBITD margin (mean: 1.744%) compared to their Italian counterparts (mean: 0.286%), indicating that, despite their smaller size, Spanish firms may achieve greater operational efficiency. In terms of performance, Spanish non-treated firms also have a slight edge in log_profitperemployee (1.907 vs. 2.095 in Italy) and log_profitmargin (1.381 vs. 1.434), suggesting that they are more efficient and profitable on a per-employee basis and may achieve better margins. (Table 2. & 3.)

Non-treated firms in both Italy and Spain tend to be larger, with greater assets and capital than treated firms, though treated firms generally achieve higher EBITD margins. In comparing the two countries, Italian firms—both treated and non-treated—are generally larger in terms of

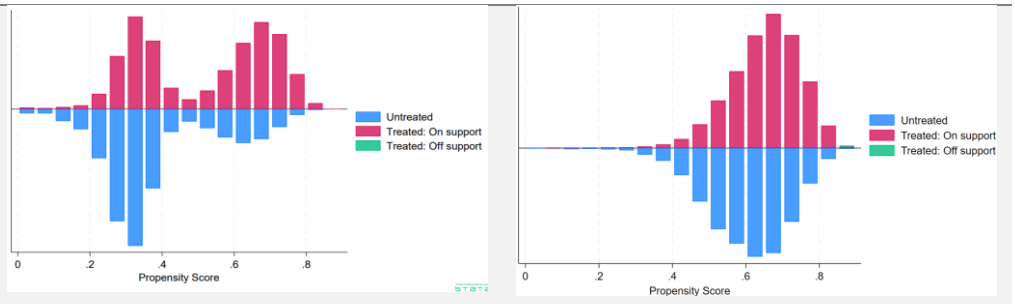
turnover, assets, and capital. Still, Spanish firms tend to perform better in terms of operational efficiency and profitability, as indicated by higher EBITD margins and better performance on log_profitperemployee and log_profitmargin. These findings suggest that while Italian firms may enjoy greater scale, Spanish firms demonstrate more efficient utilization of their resources. This report examines the distribution and impact of state aid in Spain, focusing on firms impacted by the COVID-19 pandemic. A substantial proportion of the firms analyzed consist of micro and small enterprises. 40% of these firms received government support to alleviate economic disruptions, which primarily targeted smaller businesses in need of immediate assistance.

Matching

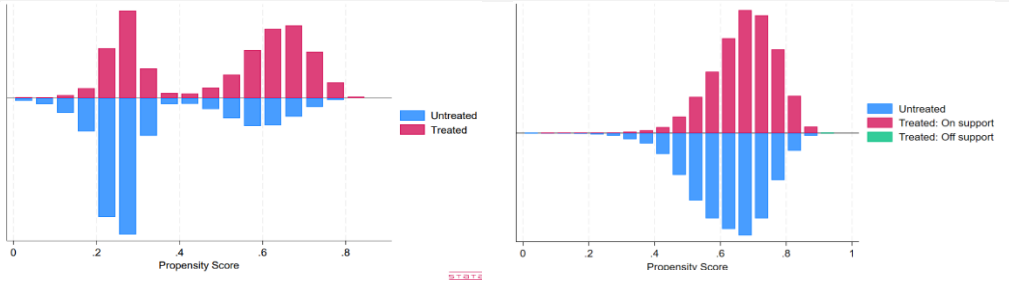
This section showcases the matching process and distribution of Propensity Scores for both nationwide and regional data sets. The following histograms illustrate how the characteristics of treated and untreated firms are balanced, and their respective propensity scores overlap.

Spain *Italy*

National



North



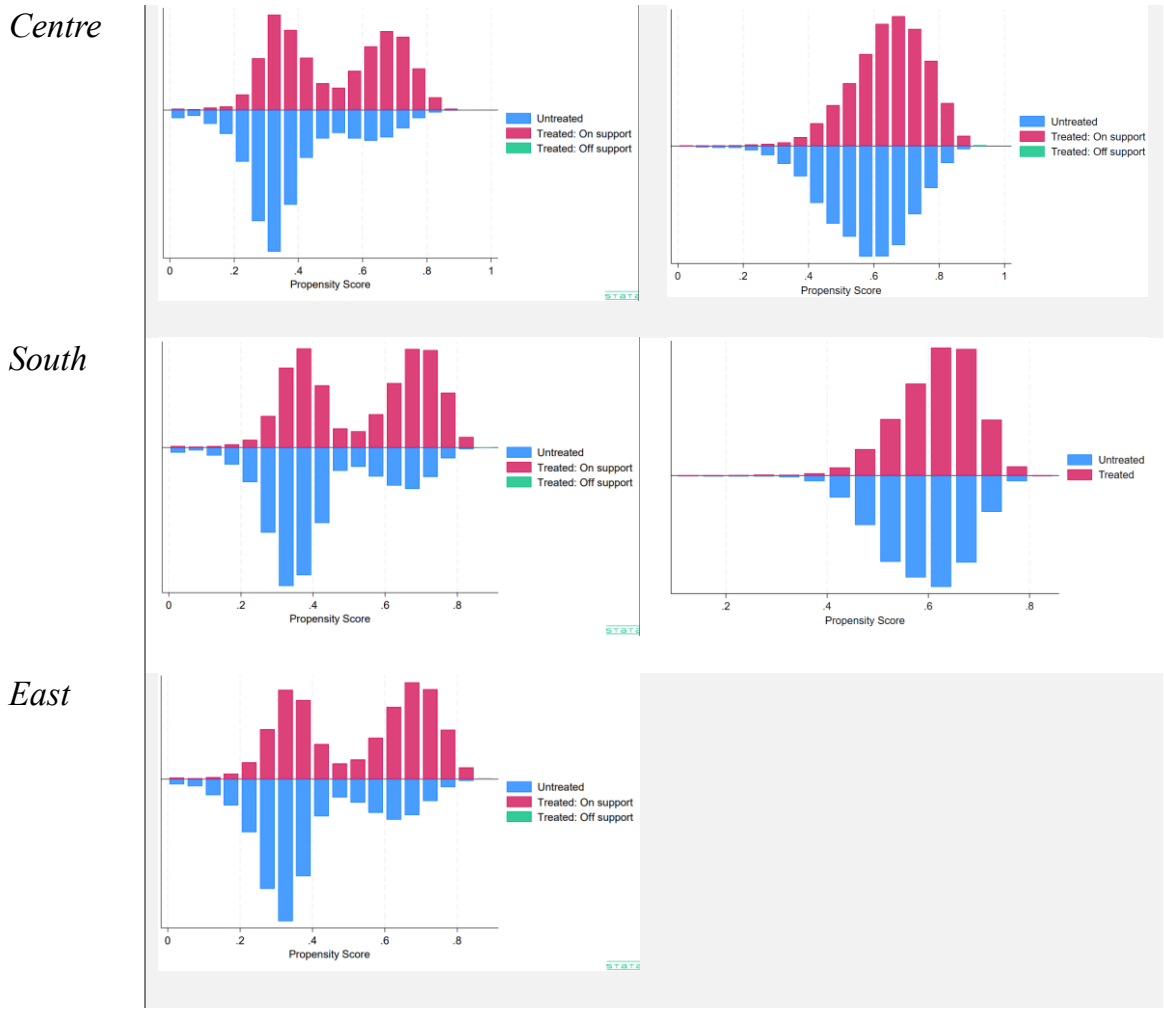


Table 12: Propensity Score Distribution across domestic and regional data samples for Italy and Spain.

In Spain, across all regions, the treated group tends to have a wider range of propensity scores compared to the untreated group. For instance, at the national level, treated individuals have scores spanning roughly from -0.3 to 0.5, while the untreated group is concentrated more between -2 and 3. This indicates significant overlap, but a moderate group of treated individual firms with propensity scores greater than 3 remain without a corresponding untreated partner. A similar pattern is seen across the North and Centre regions, with treated individuals showing scores from approximately -3 to 5, while the untreated group's scores are more centered between -2 and 2. In contrast, Italy displays a better balance between the groups. At the national level, both treated and untreated individuals have more symmetrical distributions centered around 0, with both groups covering a range from about -4 to 4. In particular, the treated individuals in Italy's Centre and South regions are more evenly distributed across a narrower range of

propensity scores (roughly -2 to 4). This leads to the conclusion that the available data for Italy was already relatively balanced, making the matching process less pronounced.

Regional Variations

The south region in Spain shows a notable imbalance, with fewer untreated individuals covering the higher propensity scores (3–5) occupied by treated individuals. In Italy, regional differences exist, but they are less pronounced than in Spain. The North and South regions both show more balanced results, particularly in the central range between -2 and 3. For instance, in Italy's South region, the treated individuals are concentrated between -2 and 3, closely matching the untreated group, further supporting Italian data to be more balanced previously to the matching process (See appendix, Langewald, 2024).

Effects of State Aid on Company Performance in Italy

The COVID-19 pandemic prompted many governments, including Italy, to implement state aid programs aimed at mitigating the economic fallout for businesses. This section analyzes the impact of state aid on Italian companies, focusing on regional and industry differences. A particular emphasis is placed on the number of employees as a key indicator of labor market resilience, as well as overall company performance across different profit margins and sectors.

Regional Differences in the Effects of State Aid

Country (Region)	Italy (National)	Italy (North)	Italy (Centre)	Italy (South/Insular)
Dependent variable				
Turnover (IHS)	0,085*** (0,000)	0,085*** (0,000)	0,062*** (0,000)	0,060*** (0,002)
Total Assets (IHS)	0,106*** (0,000)	0,093*** (0,000)	0,091*** (0,000)	0,086*** (0,000)
Capital (IHS)	0,016*** (0,002)	0,018*** (0,004)	0,007 (0,549)	0,005 (0,786)
log Number of employees	0,053*** (0,000)	0,048*** (0,000)	0,048*** (0,000)	0,049*** (0,002)

log gross Profit	0,095***	0,091***	0,074***	0,040*
	(0,000)	(0,000)	(0,000)	(0,060)
log profit per employee	0,068***	0,090***	0,044**	-0,010
	(0,000)	(0,000)	(0,022)	(0,728)
log profit margin	0,037***	0,054***	0,033**	-0,021
	(0,000)	(0,000)	(0,040)	(0,415)
Ebit Margin (IHS)	0,045***	0,056***	0,043***	0,008
	(0,000)	(0,000)	(0,004)	(0,748)
Sample Size (N=)	472.517	269.006	124.889	78.583

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 13: Average treatment effect of firms that received state aid in 2020. The table shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The table provides an overview of the differences in effectiveness of state aid in Italy

The effectiveness of state aid in Italy varied significantly by region. In the north, where industrial activity is more concentrated, the impact was more pronounced across several performance metrics. In contrast, companies in the south and insular regions benefitted less from the aid programs.

State aid led to significant increases in turnover across all regions. The largest effects were seen in the north, where companies that received state aid in 2020 performed 8,5% (+0.085***) better afterward than the companies that did not receive state aid. In the center, companies that received state aid performed 6,2% (+0.062***) better than the companies that did not receive state aid. The south/insular regions exhibited smaller but significant effects (+0.060***). Similar regional patterns can be observed for the total assets of the companies that received state aid. The north (+0.093***) and center (+0.091***) show higher effects of state aid compared to the south/insular areas (+0.086***). The impact on capital formation was significant at the national level (+0.016***) and in the north (+0.018***) but negligible in the central (+0.007) and southern/insular regions (+0.005).

The regional discrepancies across Italy in the effectiveness of state aid can be explained by the initial situation before the COVID-19 pandemic. Better infrastructure and higher skill levels

could have led to better and faster utilization of state aid, which ultimately increased the effectiveness of state aid regimes.

Employment Impact

A core objective of the state aid allowed by TF was to preserve jobs (The Commission 2020c). Across all regions and sectors, the aid had a significant positive effect on employment levels, though the degree of impact varied.

Nationally, state aid increased the log number of employees by 5,3% (+0.053***). Regionally, the north (+0.048***) and center (+0.048***) saw similarly strong effects, while the south/insular regions experienced slightly higher gains (+0.049***).

This suggests that state aid effectively prevented large-scale job losses across Italy, although the northern and central regions showed slightly less robust job preservation. The higher concentration of industrial activity in these areas likely contributed to this outcome, as sectors with higher employment levels were able to compensate for economic down phases with short-time work schemes (Boeri and Bruecker 2011; Cahuc and Carcillo 2011; Drahokoupil and Müller 2021). Sectors with lower employment numbers could not do so and relied on state aid to keep employment high.

Industry Differences in the Effects of State Aid

Country (Industry)	Wholesale	Manufacturing	Construction
log Number of employees	0,026*** (0,001)	0,049*** (0,000)	0,092*** (0,000)
log gross Profit	0,046*** (0,000)	0,084*** (0,000)	0,130*** (0,000)
log profit per employee	0,037** (0,036)	0,096*** (0,000)	0,034* (0,082)
log profit margin	0,026* (0,074)	0,064*** (0,000)	-0,006 (0,712)
Ebit Margin (IHS)	0,026** (0,048)	0,066*** (0,000)	0,014 (0,344)

Sample Size (N=)	127.037	119.991	116.269

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 14: Average treatment effect of firms that received state aid in 2020. Shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The tables show the industry differences in the effectiveness of state aid in Italy

The analysis of state aid's impact across the different industries reveals significant variability in outcomes. Manufacturing benefits the most, followed by construction and wholesale.

The number of employees varied a lot across industries. The construction industry saw the largest gains in employment (+0.092***), followed by manufacturing (+0.049***) and wholesale (+0.026***). The higher effect in construction can be attributed to the sector's labor-intensive nature, where aid helped to retain a substantial workforce.

The impact of state aid on companies' gross profit was even higher than on the employment levels but also varies across industries. Construction shows the highest gains (+0.130***), followed by manufacturing (+0.084***) and wholesale (+0.046***).

For the profit per employee, different trends can be seen. While the manufacturing sector benefited the most in terms of profit per employee (+0.096***), wholesale (+0.037**) and construction (+0.034*) showed more modest increases.

Despite these positive trends, profit margin improvements were inconsistent across sectors. While manufacturing experienced significant gains (+0.064***), wholesale showed a marginal increase (+0.026*), and construction had no significant effect (-0.006, p = 0.712).

Labor-intensive industries usually needed aid to maintain the workforce and keep up with the labor costs, while manufacturing and wholesale could use state aid for production lines and storage.

Profitability Differences in the Effects of State Aid

Country (Region)	Italy (low margin)	Italy (medium margin)	Italy (high margin)
log Number of Employees	0,012	0,027***	0,061***
	(0,463)	(0,002)	(0,000)

log profit per Employee	0,039 (0,155)	0,004 (0,802)	0,029** (0,018)
log Profit Margin	0,038 (0,138)	-0,003 (0,755)	-0,006 (0,480)
log gross Profit	0,039** (0,048)	0,042*** (0,000)	0,108*** (0,000)
Ebit Margin IHS	0,017 (0,270)	0,011 (0,192)	-0,004 (0,614)
Sample Size (N=)	24.727	119.951	128.956

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 15: Average treatment effect of firms that received state aid in 2020. Shows the average marginal effect of receiving aid in the post-treatment period of 2021 & 2022. The table shows Differences in the Effectiveness of State Aid in Italy based on Profit Margin

Companies were also categorized based on their profit margins—low margin, medium margin, and high margin—to further analyze the differential impact of state aid.

High-margin firms exhibited the most substantial gains in employment (+0.061***), gross profit (+0.108***), and profit per employee (+0.029**). This suggests that companies already in a stronger financial position were better able to leverage state aid to maintain and even grow their workforce.

Medium-margin firms saw moderate but significant increases in employment (+0.027***) and gross profit (+0.042***), although profit per employee gains were negligible (+0.004, p = 0.802).

Low-margin firms benefitted the least from state aid. While gross profit increased slightly (+0.039**, p = 0.048), employment effects (+0.012) were not statistically significant, indicating that struggling firms were less able to retain employees despite government assistance.

Policy Implications/Recommendations

The analysis indicates that state aid in Italy was most effective in regions and industries with higher pre-existing levels of economic activity, such as the north, and sectors like manufacturing and construction. These areas saw the greatest gains in employment and

profitability metrics, suggesting that state aid successfully supported firms that were already relatively robust.

In contrast, firms in the south and low-margin companies experienced less pronounced benefits from state aid, with smaller increases in employment and profitability. This discrepancy highlights the challenge of using uniform aid programs across regions with different economic structures and needs. Low-margin firms and regions with weaker economies may require more tailored or intensive forms of support to achieve similar outcomes.

The number of employees was consistently impacted across regions and industries, reaffirming the program's effectiveness in preventing widespread job losses. However, the differential impact across regions and sectors suggests that while state aid was a lifeline for many, its distribution and effectiveness were uneven, and additional targeted measures may be required to support struggling firms and regions more effectively.

The analysis shows that state aid in Italy during the COVID-19 pandemic had a substantial positive impact on firm performance, particularly in employment retention, gross profit, and profit per employee. However, regional disparities indicate that the north and center benefitted more significantly than the south and insular regions. Similarly, high-margin and manufacturing firms leveraged the aid more effectively, while low-margin and wholesale firms experienced more limited gains. These findings suggest that future aid programs should consider the economic context and specific needs of different regions and sectors to maximize their effectiveness. Responsibilities for state aid approvals could be given to a more regional governance level to fulfill specific needs and uphold the subsidiarity principle of the European Union.