

Ex post analysis of State aids : Empirical study of restructuring aids impact on the recipient's performances

Abstract

This paper is studying the impact of restructuring State aids on recipients' performances (measured through the profit, investment, total factor productivity and employment). Restructuring aids are supposed to help firms in difficulty by allowing State resources to finance their restructuring plans. However, since they may give an unfair advantage to the recipient, they are subject to the implementation of compensatory measures, which are mainly production restrictions. In this paper, we want to study if restructuring aids really benefit to the recipients despite the compensatory measures and if those recipients are able to restructure. A new database including 33 restructuring cases and more than 700000 European firms was created to do that. We find that restructuring State aids only has a positive impact on the employment and productivity of the firm in difficulty when accounting for national specificities, and that the effect disappears as soon as there are compensatory measures.

Introduction

During the last ten years, State aids and their regulation have become one of the core fields of the European competition policy. Between 1992 and 2011, 1603 billion euros were attributed to European firms as State aids. Since they may have a potential negative impact on competition and consumers (exit of the most efficient firms, crowding out effect...), they are forbidden by the article 107 of the Treaty on the functioning of the European Union, but with some exceptions since they can compensate market failures (by saving jobs for example). In this paper, we focus on restructuring State aids given to firms in difficulty. We start from a simple observation : most of those aids are conditional to restrictions on the production of the recipient as compensatory measures. In our database for example, 64.52% of firms had at least to indirectly decrease their production to receive the aid. The idea behind those restrictions is to limit the likely negative impact of State aids on rival's investment and on competition. But what is the final impact of the aid on recipients' performance when taking into account those restrictions? Do we observe an improvement of recipients' performances after the aid? This is what we are trying to assess by analyzing

four performance indicators (profit, total factor productivity, investment and employment) of restructuring firms after an aid. To do that, we will use a counterfactual analysis based on matching and diff-in-diff methods. Using four different indicators offers a large view of what performance is made of, and may help us see if there is a more precise goal for restructuring State aids (or at least of those aids have a higher impact on a particular indicator).

For the matching model, we will apply the method used by Czarnitzki & Fier (2002) in their paper on the potential crowding out effect of innovation subsidies. By assuming conditional independence, they estimate through a Probit the probability for each firm to receive a subsidy. This probability is then used along with some characteristics of the firm (such as the size and the sector) to find the closest firm that did not receive an aid. They finally compare the performances of this firm (called match) with the ones of the firm receiving the subsidy to get the expected impact of this subsidy. In our paper, we will first compute the probability to receive a restructuring aid and use it to find the match for each recipient. We will then compare the performance indicators of the recipient with the one of the match to study what is the impact of the aid on the recipient.

However, since there is an important potential drawback to this method (selection bias), we also proceed to a diff-in-diff study to complete the analysis. By assuming that the evolution of the recipients and of firms belonging to the control group would have been the same if there was no aid, it measures the impact of the aid by comparing the difference of the two groups before and after the aid.

Finally, we will use exact matching to take into account that there might be some sector or country specificities that have an impact on the effect of the aid, like sectoral/national shocks or specific regulations. Each one of these matching gives us an idea of the impact of the aid on recipients' performance, and will be done both on all aids recipients and only on recipients that have been constrained on their production, because it is crucial to take compensatory measures into account.

To apply those methods, we have created a new database with 33 restructuring cases in 33 sectors. Accounting data of European firms in those sectors were collected from Amadeus of Bureau van Dijk to construct the control group and to allow us to find a good

match. Preliminary results show that State aids seem to be inefficient at helping firms in difficulty, since they have no impact on recipients' performance, even two years after the aid. This result holds both with the propensity score matching and the diff-in-diff model, for all recipients, either they were constrained or not. However, exact matching on the country of the aid teaches us that when we take into account national issues, there is a positive effect of the aid on the total factor productivity and employment of recipients. Nevertheless, this effect.

Few papers analyze the survival of State aids recipients. Chindooroy, Muller & Notaro (2007) show that the survival of recipients increases with the amount of aid, the age, the number of instruments used for the aid, better initial conditions before the aid and an increasing demand. On the contrary, the likelihood to survive is decreased for public firms and big firms, or when the difficulties of firms are due to a liquidity issue. Glowicka (2006) shows that the survival of ailing firms must be analyzed in the long run. Indeed, she shows that restructuring aids are quite useful to prevent firms from exiting the market in the short run, but are usually inefficient in the long run. The survival of firms is studied through hazard rates, and Glowicka (2006) states that the endogeneity of the decision to give an aid must be taken into account, since the European Commission only allows restructuring aids if she believes in the viability of the restructuring plan and of the firm. Finally, a recent report of the European Commission (2016) also evaluates the ex post effect of restructuring State aids. It creates a measure of viability of firms and studies the probability to have an improved viability thanks to the aid. It shows that the aid is quite satisfying in the sense that it indeed increases the probability to have an improved viability. Our work differs from this paper by the method used. We measure the performance through a set of variables while the European Commission report uses the probability of having an improved viability. Moreover, it does not use diff-in-diff models, and does not directly treat the compensatory measures.

Section 1 presents the matching and diff-in-diff models, section 2 provides a description of our newly created database, section 3 presents the results of the matching and diff-in-diff for each of the 4 performance indicator. Section 4 analyzes the robustness of these results through exact on the country and on the sector, and section 5 concludes.

1 Model

In this part, we want to use a counterfactual analysis to assess the impact of the aid and of compensatory measures on recipients' performance (and on their evolution). This counterfactual study will be done by using two models : the Propensity Score Matching and the diff-in-diff model.

A Propensity score matching

The idea behind the propensity score matching is to find for each recipient of the aid the closest firm in our control group. This match will be found by comparing the propensity score of firms of the control group with the one of the recipient of the aid. The first step to find the match is hence to use a Probit model in order to compute the probability of receiving an aid for each firm (propensity score). This one is defined by :

$$P(Aid = 1|X) = \phi(X^T \beta) \quad (1)$$

where Aid is a dummy variable which equals 1 when there is a restructuring aid, ϕ is the cumulative distribution function of the standard normal distribution and β are coefficients estimated by the maximum likelihood. Here, X are the characteristics of the firm and of the aid that impact the probability to receive an aid, but also the performance variable that is used. As a consequence, it includes common explanatories (that we will discuss here), but also some additional explanatory variables for each performance indicator. According to the European Commission, conditions to receive an aid depend on the size of the firm (SME having less restrictive conditions to receive a restructuring aid) and on the difficulty and characteristics of the firm (a firm must be in difficulty¹ in order to receive an aid). That is why we introduce the size ($size_t$) of firms but also their long term debts ($long\ term\ debts_t$), solvency ratio ($solvency\ ratio_t$), investment (inv_t) and capital ($capital_t$) in our Probit model, because those variables give an idea of the financial health of a firm².

1. "An undertaking is considered to be in difficulty when, without intervention by the State, it will almost certainly be condemned to going out of business in the short or medium term", Guidelines on State aid for rescuing and restructuring non-financial undertakings in difficulty, 2014

2. We do not introduce the profit of the firm in the explanatories because of balancing issues when we do so. The balancing property is supposed to ensure that observations with the same propensity score have the same distribution of observable explanatories, independently of whether they were treated or not. It also ensures that for a given propensity score, assignment to treatment is "random" and therefore treatment

Moreover, we also introduce the workforce of firms ($work_t$) because sometimes restructuring aids can be allowed to save jobs.

Since additional variables (that are discussed each time in section 3) are not always the same (depending on the performance indicators), it leads to different control groups. This complicates the comparison of the effect, but since we control for the quality of the match, he does not change the results.

In this paper, since we have many firms in the control group (around 700 000) while there are only a few restructuring State aids cases, we always run the Probit on a subsample including 200 firms, to control that the propensity scores will not be driven by the high number of non-recipient firms. Even if this subsample has been randomly drawn, it is quite representative of the total control group since it does not differ significantly (as shown in table 24 of the appendix).

Once the Probit is done, the match is found by comparing the propensity score for recipients and for firms of the control group. Matches are selected by choosing firms that have the closest propensity score.

The next step is then to compare the performances of the recipient and of its match. This gives us the expected effect of the aid on the recipient's performance (denoted θ) :

$$E(\theta) = E(y_R|I = 1, X) - E(y_{NR}|I = 0, X) \quad (2)$$

where I is the treatment, R stands for the recipient and NR for the control group. The recipient's performance is denoted y. In this paper, we will use several indicators to measure the performance of the recipient at the time of the aid. The profit is one of the indicator allowing observers to see whether the firm is getting viable again. Obviously, on the one hand recipients expect to become more profitable thanks to the aid, otherwise they would not ask for it. But compensatory measures may reduce their production and/or sales, compromising their chance to get better and reducing their profit.

We are also interested in the impact on recipients' total factor productivity (TFP). This variable is a quite good indicator of the success of the restructuring : one can expect that a firm will become more productive and efficient thanks to the aid, and looking at the TFP is one of the way to study that.

and control units are observationally identical on average." Balancing issues are moreover the other reason why we do not use the same explanatories when dealing with the different performance variables

We also carry on with the analysis of the impact of the aid by looking at the way it impacts investment. Are recipients able to invest following a restructuring aid to implement their restructuring? Do the compensatory measures push them to reduce their investment because they will be less profitable?

Finally, we are analyzing the effect of the aid on the workforce of recipients. On the one hand, the aid may allow firms to preserve jobs that would have been suppressed otherwise. But on the other hand, compensatory measures and the restructuring plan can push firms to reduce their number of employees because they reduce their production or have to leave aside some activities that are unprofitable.

We hope that with those four indicators, we will get an idea of the scope of the effect of the aid on recipients' performances.

Propensity score matching has some limits and drawbacks that are studied by the European Commission in its working document of 2014 on the methodology to evaluate State aids. The main drawback comes from the conditional independence assumption. It assumes that once we have controlled for the observed variables, there is no other unobserved variable impacting both the probability to receive an aid and the performance of the firm. In the case of restructuring State aids, this may not be the case because we cannot observe the restructuring plan, while this one has an impact both on the decision of the European Commission to allow the aid and on the results of the recipient after the aid. We try to control that by including in our database some aids that have been used illegally or that have received a negative decision from the European Commission. Indeed, the European Commission forbids an aid when she has some doubts on the restructuring plan, on the own participation of the firm or on the distortions of the competition, but usually, this is a mix of those 3 reasons. Hence, it is likely that recipients who have received a negative decision were not viable enough to convince the European Commission, and taking them into account reduces the selection bias. However, since this solution may not be sufficient, we also follow the advice of the European Commission and use diff-in-diff to complete the analysis.

B Diff-in-diff

The idea behind diff-in-diff is still to estimate the effect of the aid on the recipient, but here, we study the evolution of the difference between recipients and firms of the control

group before and after the aid. The estimator is :

$$\hat{\delta} = (\bar{y}_{A,2} - \bar{y}_{A,1}) - (\bar{y}_{NA,2} - \bar{y}_{NA,1}) \quad (3)$$

Where 1 is the period before the aid and 2 is the situation after the aid. \bar{y} represents the estimation of the performance.

This model assumes that besides the aid, recipients and firms of the control group have the same evolution, and that the difference of performance between the two types can only be due to the aid. The difficulty of the diff-in-diff comes from the choice of the control group, because it is hard to find one for which the difference with the recipients are stables and evolve in the same way over time. There is also a risk that the reception of the aid for some firms and not for others comes from some fundamental differences, leading to divergences in the evolution which will not be due to the aid. We expect however that our control variables prevent us from having too big differences.

Finally, another potential identification issue exists because of a too strong homogeneity between the recipient of the aid and the control group but it does not seem to be the case in our data, since we have a large dataset and since firms were quite different before the matching process.

2 Data

A new database was created in order to test the impact of the aid on the recipient. This one covers a nine years period, from 2006 to 2015, and includes 33 restructuring State aid cases from 11 different countries, and around 700 000 European firms in sectors at stake. We do not include State aids given to the financial sector since they are not submitted to the exact same regulation and since they affect firms in a complete different way. We also exclude the agricultural aids because of data issues and specificities of the agricultural sector in Europe, and the aids in the air sector, because they are too recent and there are too many aids in the same year (identification issues).

State aids data are collected from the European Commission website, which provides State aids decisions and the decision letters addressed to Member States. Thanks to this, we have access to the amount of the aid, the own participation of the recipient to the restructuring plan, the instruments used for the aid and the conditions imposed to the firm

in order to receive it (compensatory measures). It also includes data on the recipient of the aid. Is this firm public? Has she previously received a rescue aid? Does she belong to a group? What is her nationality and date of creation?

The aids' amount is of 58.8 million euros on average. Direct grant, debt write off and soft loans are the most used instruments, and most of the time, States are using a single instrument to help recipients. In almost 64.52% of cases, restructuring State aids are followed by a limitation on the recipient's production, either through a direct reduction of the production (48.39%), or through a reduction of labor and assets (16.13%). Those data are coded by differentiating 3 groups : firms with direct restrictions on the production (reduction of production, sales or market share), firms with indirect ones (decrease of the workforce or assets), and firms with no restrictions on the production. In our sample, firms in difficulty are in majority large private firms which do not enter a national bankruptcy procedure. According to E. Glowicka (2006), this should reduce their survival rate after the aid because contrary to the case in which they fulfil a bankruptcy procedure, decisions are not taken by a liquidation agent which is more rationale. The European Commission allowed 28 cases and refuses only 5 projects : the negative impact of the aid seems to be low enough comparing to the benefit of State aid in most cases.

As we want to use a counterfactual analysis by comparing the recipient with its match, we need both sectoral and individual data to find a correct match. Sectoral data are downloaded from Eurostat. Sectors are defined as the 4 digits Nace code, and data provide us for the EU the value of the sectoral turnover ($turnoverEU_t$), as well as the number of firms ($firmsEU_t$). This allows us to have an idea of the financial health of the sector, which is quite important because the European Commission is more willing to allow an aid if the sector is in difficulty.

Finally, individual data for European firms (constituting the control group) come from Amadeus of Bureau Van Dijk. It provides accounting data such as the profit ($profit_t$), investment (inv_t), debts ($long\ term\ debts_t$) or solvency ratio ($Solvency\ ratio_t$); but also gives data on the workforce, size and sector of each firm, allowing us to have sufficient data to find a good match. All the data used in this paper can be found in table 25 of the appendix.

	Data	Number of recipients
Conditions	Public firm	12
	Rescuing aid before	14
Size	Very large firms	4
	Large firms	10
	Medium firms	12
	Small firms	7
Decision	No objection	18
	Positive decision	7
	Conditional decision	3
	Negative decision with recovery	5
Country	Austria	1
	Belgium	1
	France	4
	Germany	1
	Greece	2
	Italy	4
	Lithuania	1
	Poland	14
	Slovenia	1
	Spain	2
	United Kingdom	1
Sector (1 digit)	Mining and quarrying	1
	Manufacturing	20
	Electricity, gas, steam & air conditioning	1
	Wholesale & retail trade, repair of motor vehicles and motorcycles	6
	Transportation and storage	3
	Other service activities	1

3 Results

In this section, we will present the results of the propensity score matching and of the difference-in-difference. Everytime we study the impact of the aid, we do it both on all firms and on constrained recipients only because the impact can be different when the firm is limited on her production. As the first step is always to get the propensity score to find the match, we will start by presenting the results of the probit. We will then observe whether there is a significant effect of restructuring State aids and will finally test the quality of the match.

A Probit

As we previously discussed in the model section, the determinants of the probit change with the performances indicator that we are studying. Results are summarized in table 1. We can see here that the probability to get an aid is mainly driven by the employment of the firm. The higher it is, the more likely the firm is to get an aid. Member States and the European Commission hence seems to want to save jobs by allowing restructuring aids. The cost of labor on the contrary diminishes the probability to receive an aid because a large cost may prevent firms to save jobs despite the aid.

Regarding the impact of the aid on profit, we just add the lag of the operational cash-flow in the explanatories, because it gives an idea of the firm's ability to invest in the future. This one impacts positively the probability to get an aid, by reinsuring on the viability of the firm.

When we study the impact of the aid on the total factor productivity, we have to introduce the capital and labor cost in the probit since it will have an impact on firms' productivity. The labor cost is the only one playing a role here, by negatively influencing the probability to get an aid. We also control for competition by introducing the number of firms located in the sector in the EU, but it does not seem to have an impact here.

For measuring the impact on investment, we have decided to add the long term interest rate (the lower it is, the cheaper is investment, the higher should be the probability to receive an aid) and some european indicator of the sectoral financial health. However, none of them were significant while the debt increases investment (probably in a mechanic way). We also introduced those determinants for the employment, as well as the TFP of the firm, and there is still no significant impact.

TABLE 1 – Probit on the probability to get an aid

Variable	Production		TFP		Investment		Employment	
	All	Const.	All	Const.	All	Const.	All	Const.
Debts	0.000	0.000	0.000	0.000	0.000**	0.000**	0.000	0.000
Solvency ratio	-0.001	0.009	0.000	-0.027	-0.001	0.011	-0.035**	-0.041
Employment	0.012***	0.014***	0.008**	0.009**	0.006**	0.012***		
Investment	0.000	0.000	0.000	0.000			0.000	0.000
Size	-1.114	-0.775	-0.225	1.686	-0.388	-0.351	1.21**	2.029***
Capital	0.000***	0.000	0.000	0.000	0.000	0.000		
Cash flow	0.000***	0.000***						
Long term interest			0.048	-0.116	0.082	0.017	0.054	-0.128
Labor cost			-0.001**	-0.003**			-0.002**	-0.002**
FirmsEU			0.000***	0.000	0.000	0.000	0.000	0.000
TurnoverEU					0.000	0.000		
TFP							0.000	0.000
Intercept	-1.024	-2.121	-1.024	-1.024	-1.158***	-1.583***	-2.172***	-2.411**

Significance level : * :10%; ** :5%; *** :1%

We can see here that the size plays on the probability to get an aid, contrary to the results of other performance indicators. It certainly comes from the fact that State aids are still influenced by the employment of the firm, that we can't introduce here.

Total Factor Productivity

As total factor productivity (TFP) is not directly available in the data, we have to estimate it, and we do that by following the method proposed by Levinsohn & Petrin (2004). The idea is quite simple : productivity (and productivity shocks) directly impacts the production function, and we can hence derive the total factor productivity by comparing the estimation of the production with its observed level. The first stage to get the TFP is therefore to estimate the production function. In this one, we have to proxy the productivity, and the novelty in Levinsohn & Petrin (2004) is that they use the intermediate inputs instead of investment to do that (like in Olley & Pakes (1996)), because investment is too lumpy and imposed to suppress all firms having a zero investment from the estimation. In the case of a Cobb-Douglas production function, we estimate :

$$Y_{t,i}^p = \beta_0 + \beta_l \ln(l_{t,i}) + \beta_k \ln(k_{t,i}) + \beta_m \ln(m_{t,i}) + \omega_{t,i} + \eta_t \quad (4)$$

where $l_{t,i}$ is the workforce of firm i , $k_{t,i}$ its capital, $m_{t,i}$ the intermediate input (measured as the material costs faced by a firm) and $\omega_{t,i}$ is an error term which is a function of $l_{t,i}$ and $k_{t,i}$ and which is interpreted as the total factor productivity. The second stage is the estimation of this parameter :

$$\omega_{t,i} = Y_{t,i}^p - Y_{t,i} \quad (5)$$

B Results on the performance indicators

Now that we have found a match for all firms in difficulty thanks to our Probit regressions, we can study the impact of the aid on all performance indicators.

Table 2 shows that the aid does not have any impact on recipients' performance, whatever is the performance indicators, and for all firms, whether they are constrained or not. Those first results seem to indicate an inefficiency of restructuring State aids since those

TABLE 2 – Estimation of the mean effect of the aid on recipients’ performance, with propensity score matching

Performance indicator	Mean effect of the aid on all recipients	Mean effect of the aid on constrained recipients
Profit	-2.80e+07	-3.43e+07
TFP	121794.7	95968.34
Investment	1.69e+07	2.37e+07
Workforce	698.8	703.72

Significance level : * :10% ; ** :5% ; *** :1%

aids do not succeed to improve the performances of recipients. Let’s redo the analysis with diff-in-diff to see whether the same results can be found.

TABLE 3 – Estimation of the mean effect of the aid on recipients’ performance, with diff-in-diff

Performance indicator	Mean effect of the aid on all recipients	Mean effect of the aid on constrained recipients
Profit	321833.4	110295.1
TFP	20465.04	43523.54
Investment	-1074832	-1511982
Workforce	-34.875	-44.286

Significance level : * :10% ; ** :5% ; *** :1%

Table 3 shows that there is still no significant impact of the aid on recipients performances.

C Quality of the matching process

Facing those results, we had to test the quality of the match to see whether the absence of effect comes from a bad matching process or really highlights that restructuring State aids have no impact on recipients’ performances. To do that, we have first compare the difference between firms in difficulty and the control group, before the match (i.e. when the control group is composed of all firms) and after it. Results of the pre-matching comparison are summerized in table 4 and 5.

Firms in difficulty who received an aid are fundamentally different. They are significantly larger and have way much more employees (confirming that the European Commission and the Member States may want to help recipients to preserve a large number of jobs). They invest more and have more capital but they are also poorer, and in a worst financial situation (they have more debts).

However, when we redo the same comparison after the match, we observe that matches are way much closer from aid recipients than before (see tables 6 and 7). This is a first positive insights on the quality of the match.

TABLE 4 – Comparison before the matching process

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	63933	-1.9e+07	0.000	1.7e+05	-1.8e+07	0.036
Long term debts	1.6e+05	2.4e+08	0.000	2.1e+06	2.2e+08	0.000
Solvency ratio	26.061	31.523	0.540	32.131	25.064	0.504
Work	15.982	1781.2	0.000	25.121	18.05.3	0.0.000
Investment	31024	1.5e+07	0.000	7.08e+05	1.5e+07	0.291
Size	1.237	2.207	0.000	1.241	2.212	0.000
Capital	1.4e+05	1.5e+08	0.000	5.4e+05	1.3e+08	0.000
Operational cash-flow	1.6e+05	6.3e+07	0.000	1.6e+05	6.5e+07	0.003
	Total Factor Productivity					
TFP	32377	96315	0.546	34398	96247	0.633
Long term debts	2.1e+06	2.2e+08	0.001	1.9e+07	2.1e+08	0.417
Solvency ratio	32.131	24.287	0.394	31.741	24.287	0.394
Work	25.121	1696.3	0.000	29.241	1302.4	0.398
Investment	7.8e+05	1.4e+07	0.317	7.2e+05	1.8e+07	0.425
Size	1.241	2.290	0.000	1.236	2.295	0.000
Capital	5.4e+05	1.4e+08	0.000	4.8e+05	1.6e+08	0.000
Long term interest rate	4.103	4.347	0.499	4.127	4.349	0.516
Labor cost	1213	748.41	0.180	1341	746.34	0.125
FirmsEUt	6.3e+07	2.7e+07	0.000	6.2e+07	2.9e07	0.000

TABLE 5 – Comparison before the matching process

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	2.1e+05	1.4e+07	0.000	7.2e+05	1.8e+07	0.425
Long term debts	2.5e+05	2.2e+08	0.000	1.9e+07	2.1e+08	0.417
Solvency ratio	33.748	24.827	0.289	31.741	24.827	0.394
Work	18.877	1696.3	0.000	29.241	1302.4	0.398
Size	1.228	2.290	0.000	1.236	2.295	0.000
Capital	2.7e+05	1.4e+08	0.000	4.8e+05	1.6e+08	0.000
Long term interest rate	4.097	4.346	0.521	4.127	4.439	0.516
Turnover	9.5e+10	7.4e+10	0.244	1.0e+11	7.4e+10	0.133
FirmsEUt	6.3e+07	2.7e+07	0.000	6.2e+07	2.9e+07	0.000
	Employment					
Employment	25.121	1696.3	0.000	27.981	1717.3	0.000
Investment	7.8e+05	1.4e+07	0.317	7.6e+05	1.6e+07	0.313
Long term debts	2.1e+06	2.2e+08	0.001	1.9e+06	2.9e+07	0.001
Solvency ration	31.070	23.834	0.289	32.405	23.481	0.875
Size	1.228	2.290	0.000	1.213	2.287	0.000
Long term interest rate	4.103	4.347	0.499	4.113	4.441	0.487
Labor cost	1213	728.41	0.180	1187	923.1	0.213
FirmsEUt	6.3e+07	2.7e+07	0.000	6.7e+07	2.6e+07	0.000

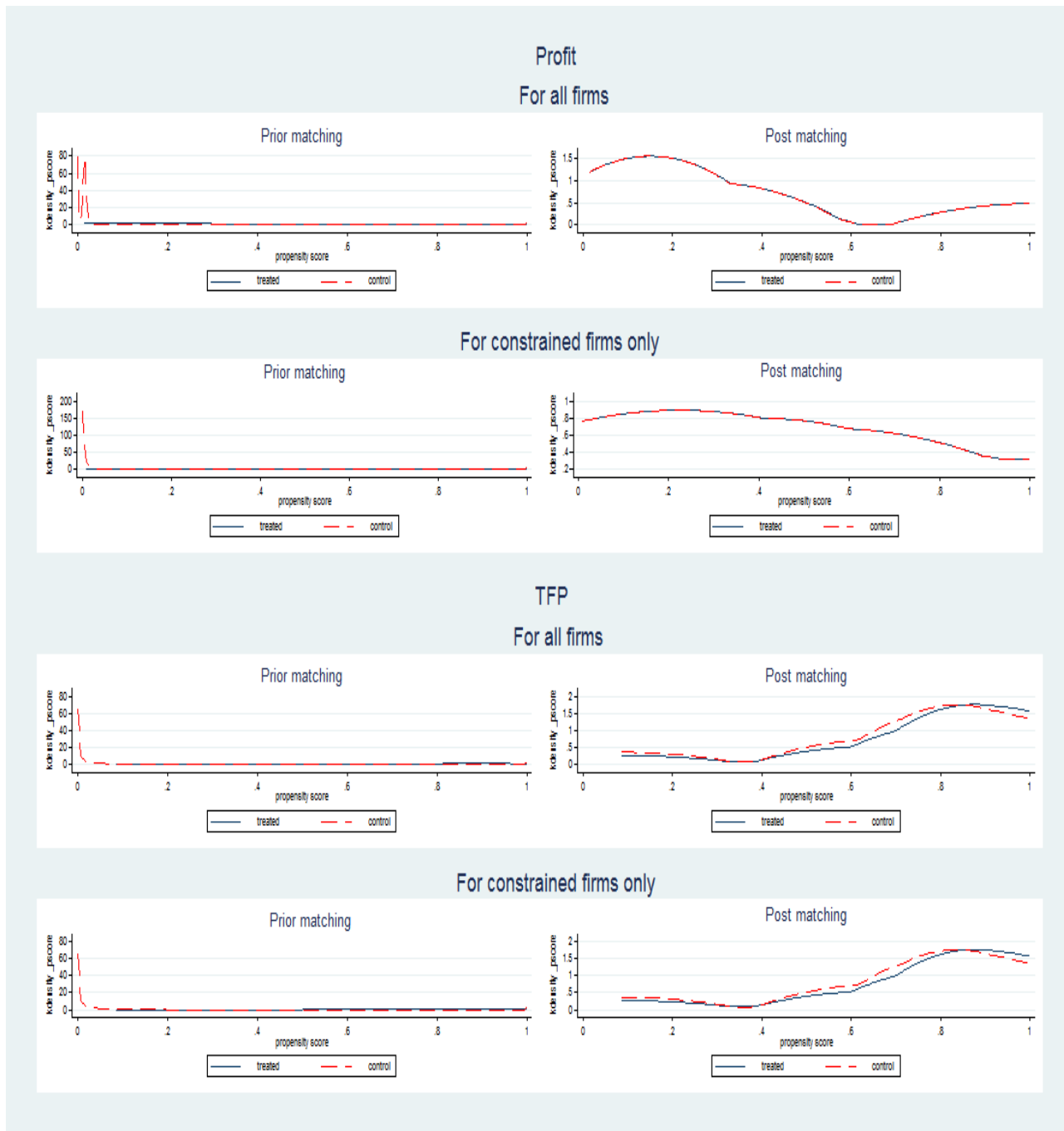
TABLE 6 – Comparison post matching process

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	-2.9e+05	-3.6e+07	0.351	-9.8e+05	-4.5e+07	0.347
Long term debts	1.2e+06	8.3e+08	0.347	1.3e+05	1.0e+09	0.356
Solvency ratio	47.407	38.842	0.661	32.063	48.208	0.400
Work	214.6	7888	0.354	422	9860	0.371
Investment	21664	4.4e+07	0.347	3.1e+05	5.5e+07	0.358
Size	2.2	2.2	1	2.75	2.5	0.766
Capital	2.7e+06	4.4e+08	0.348	6.0e+05	5.5e+08	0.255
Operational cash-flow	6.2e+05	1.1e+08	0.000	1.8e+06	1.3e+08	0.361
	Total Factor Productivity					
TFP	61668	1.2e+05	0.369	41910	1.3e+05	0.250
Long term debts	3.4e+05	1.6e+06	0.246	4.9e+06	1.8e+06	0.196
Solvency ratio	39.667	22.988	0.365	34.453	25.245	0.573
Work	625.56	869	0.686	598.13	948.88	0.599
Investment	4.2e+07	2.0e+06	0.007	4.8e+06	2.3e+06	0.266
Size	3	2.778	0.587	3.25	2.875	0.285
Capital	2.4e+08	2.8e+07	0.000	7.2e+06	3.2e+07	0.000
Long term interest rate	2.913	4.611	0.061	3.52	4.422	0.061
Labor cost	482.6	418.88	0.739	949.1	456.79	0.160
FirmsEUt	9.0e+06	1.5e+07	0.312	1.6e+07	3.7e+07	0.312

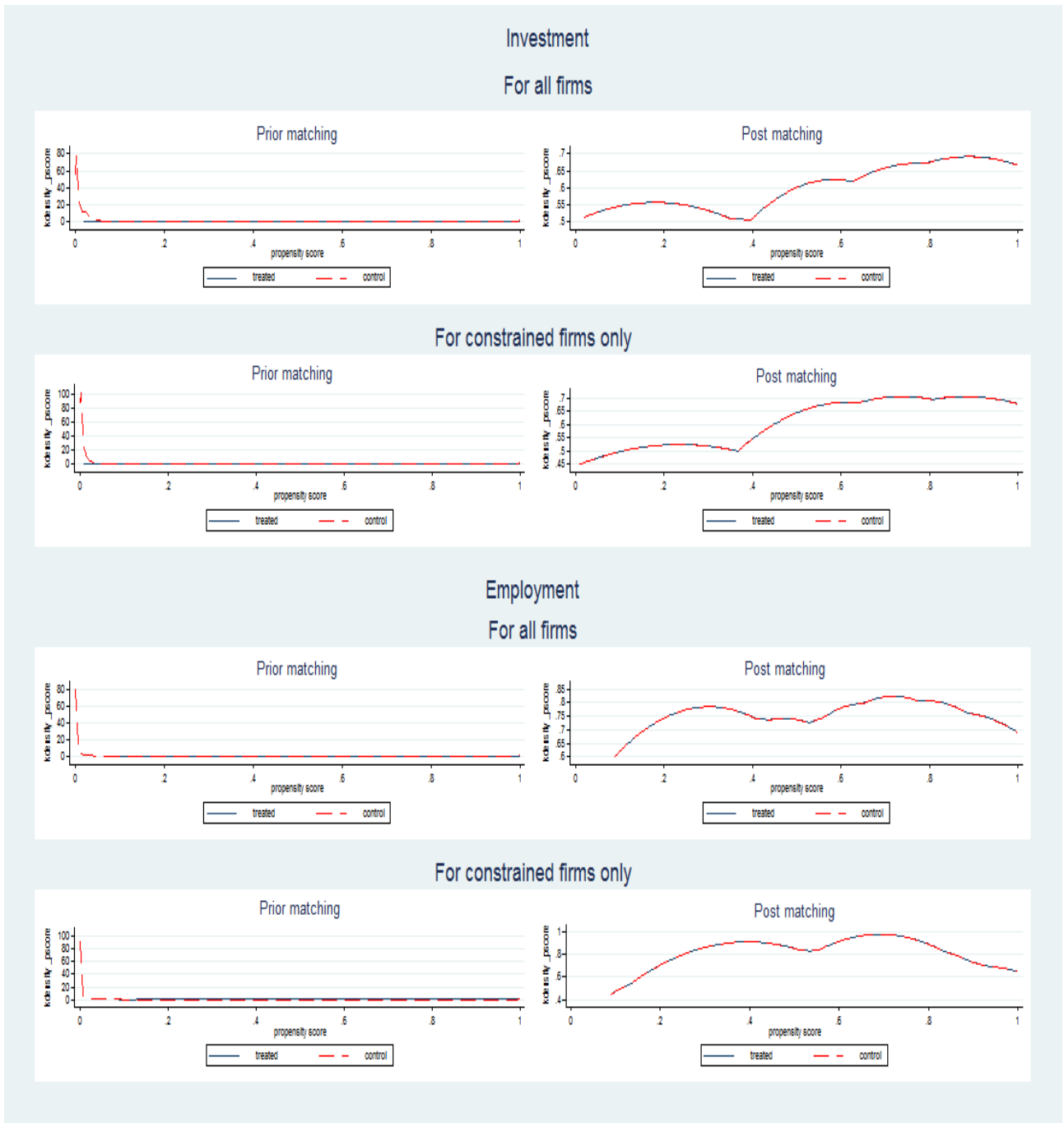
TABLE 7 – Comparison post matching process

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	4.8e+06	2.3e+06	0.266	4.8e+06	2.3e+06	0.266
Long term debts	4.9e+06	1.8e+06	0.196	4.9e+06	1.8e+06	0.196
Solvency ratio	34.453	25.145	0.573	34.453	25.145	0.573
Work	598.13	948.88	0.599	598.13	948.88	0.599
Size	3.25	2.875	0.285	3.25	2.875	0.285
Capital	7.2e+06	3.2e+07	0.000	7.2e+06	3.2e+07	0.000
Long term interest rate	3.52	4.422	0.06	3.52	4.422	0.06
Turnover	1.3e+11	9.4e+10	0.527	1.3e+11	9.4e+10	0.527
FirmsEUt	1.6e+07	3.7e+07	0.312	1.6e+07	3.7e+07	0.312
	Employment					
Employment	405.22	869	0.430	184.3	948.88	0.233
Investment	1.5e+06	2.0e+06	0.725	1.5e+05	2.3e+06	0.725
Long term debts	2.2e+06	1.6e+06	0.715	2.3e+07	1.8e+06	0.075
Solvency ration	22.988	25217	0.881	42.318	15.145	0.072
Size	2.779	2.778	1.000	3.375	2.875	0.108
Long term interest rate	4.166	4.611	0.666	3.285	4.422	0.210
Labor cost	436.999	418.88	0.935	663.17	456.79	0.345
FirmsEUt	1.0e+07	1.5e+07	0.378	9.0e+06	1.6e+07	0.228

The second test implemented to observe the quality of the match is the comparison of the density of their propensity score, and after the matching process. Those ones are reported in figure 1.



Densities are way much closer after the aid, indicating that the matching process is correct for the profit and for the TFP. We redo that for the two last performance indicators.



This figure confirms that the matching process is also correct for the investment and employment, since densities of the propensity scores are once again way much closer after it.

4 Robustness : exact matching

In the previous propensity score matching and diff-in-diff analysis, we have always chosen the match for each recipient among all European firms, without restrictions. But in practice, it is likely that in order to be a good match, a firm needs to be in the same sector

or country than the recipient. This is what we will discuss in this part by implementing exact matching. The idea is to find the closest match in terms of propensity score but among firms that share some characteristics with the recipient.

A Exact matching on the country

Let's start by discussing the exact matching on the country. There might be some country specificities (like some particular national regulation, or some country specific shocks) implying that the match needs to be in the same country as the recipient to not miss some national issues. Each match will be found by choosing the firm which has the closest propensity score in the country where the aid was received. Of course, we have to suppress national data from the Probit, so the long run interest rate will not be taken into account anymore.

Results of the Probits are quite similar to the previous ones and are reported in table 8. We still only have an impact of the number of employees and of the cost of labor (for TFP and workforce), meaning that the importance of employment for the European Commission and for Member States stays strong even when controlling for national issues. When studying the impact of restructuring State aids on production, we also get a positive impact of the past cash-flow, as previously.

TABLE 8 – Probit exact matching on the country

Variable	Production		TFP		Investment		Employment	
	All	Const.	All	Const.	All	Const.	All	Const.
Debts	0.000	0.000	0.000	0.000	0.000**	0.000***	0.000	0.000
Solvency ratio	-0.001	0.009	-0.015	-0.151	-0.001	0.001	-0.043***	-0.020
Employment	0.012***	0.014***	0.008***	0.009***	0.006**	0.004***		
Investment	0.000	0.000	0.000	0.000			0.000	0.000
Size	-1.114	-0.775	-0.109	1.089	-0.347	0.007	1.756***	0.829**
Capital	0.000***	0.000	0.000	0.000	0.000	0.000		
Cash flow	0.000***	0.000***						
Labor cost			-0.001**	-0.003**			-0.002**	-0.001**
FirmsEU			0.000	0.000	0.000**	0.000	0.000	0.000
TurnoverEU					0.000	0.000		
TFP							0.000	0.000
Intercept	-1.024	-2.121	-0.329	-3.141	-0.872***	-1.158***	-2.007***	-1.843**

Significance level : * :10%; ** :5%; *** :1%

The pre-matching comparisons are quite the same as before and we still have closer firms after the matching process than before, even though the difference after the matching process is higher than before. The pre-matching comparison is reported in table 10 and 11. The post matching comparison is reported in tables 12 and 13. We once again also report the densities of propensity scores to show that they are indeed closer after the matching process (see figures 2 and xx).

Now that we have implemented the probit to find the match and that we have checked for the quality of the matching process, we can compute the average treatment effects on the performance of the treated. This one is reported in table 9. We observe a positive effect of restructuring aids on the workforce and total factor productivity of recipients. The aid is efficient to save jobs and to increase the productivity of firms! However, those results are not holding anymore when we observe the effect on constrained firms only, meaning that compensatory measures prevent the aid from being efficient.

TABLE 9 – Estimation of the mean effect of the aid on recipients’ performance, with exact matching on the country

Performance indicator	Mean effect of the aid on all recipients	T-stat	Mean effect of the aid on constrained recipients	T-stat
Profit	-26726170.6	-1.21	-	-
TFP	121837.332	1.95	130545.568	1.07
Investment	16969338.3	0.57	21594579.1	0.48
Workforce	869	1.41	948.875	-0.02

Remark : there is a computational issue regarding the constrained firms, which prevents us from getting the post matching comparison and the average treatment effect on the profit of the treated. This is why those results are not reported here.

TABLE 10 – Comparison before the exact matching on the country

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	1.7e+05	-1.7e+07	0.044			
Long term debts	2.1e+06	2.2e+08	0.001			
Solvency ratio	32.131	24.827	0.394			
Work	25.210	1696.3	0.000			
Investment	7.8e+05	1.4e+07	0.317			
Size	1.241	2.290	0.000			
Capital	5.4e+05	1.4e+08	0.000			
Operational cash-flow	6.6e+05	5.0e+07	0.008			
	Total Factor Productivity					
TFP	8643.5	95264	0.000	8648.9	1.1e+05	0.000
Long term debts	6.9e+07	2.4e+07	0.000	4.3e+05	3.5e+08	0.000
Solvency ratio	30.553	25.561	0.527	30.546	29.729	0.394
Work	19.168	1670.3	0.000	19.185	2432.6	0.524
Investment	4.0e+05	1.4e+07	0.000	6.8e+05	1.7e+07	0.524
Size	1.211	2.290	0.000	1.211	2.526	0.000
Capital	5.4e+05	1.4e+08	0.000	6.4e+05	1.9e+08	0.000
Labor cost	705.74	569.54	0.000	705.72	577.38	0.479
FirmsEUt	6.9e+07	2.4e+07	0.000	6.9e+07	2.6e+07	0.000

TABLE 11 – Comparison after the exact matching on the country

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	4.8e+06	-2.7e+07	0.251			
Long term debts	8.5e+06	5.9e+08	0.343			
Solvency ratio	32.015	51.221	0.214			
Work	1346.1	5779.43	0.448			
Investment	1.4e+06	3.2e+07	0.351			
Size	2.714	2.571	0.803			
Capital	8.2e+06	3.2e+08	0.335			
Operational cash-flow	8.0e+06	7.6e+07	0.391			
	Total Factor Productivity					
TFP	2872.6	1.2e+05	0.069	46994	1.3e+05	0.288
Long term debts	6.9e+06	1.6e+06	0.410	7.1e+06	1.8e+06	0.469
Solvency ratio	44.036	22.988	0.078	44.859	25.145	0.063
Work	1580.6	869	0.488	1749.6	948.880	0.485
Investment	1.2e+07	2.0e+06	0.184	1.3e+07	2.3e+06	0.187
Size	3.111	2.788	0.394	3.250	2.875	0.285
Capital	3.5e+07	2.8e+07	0.788	3.6e+07	3.2e+07	0.857
Labor cost	756.880	418.880	0.447	647.73	456.79	0.702
FirmsEUt	2.2e+07	1.5+07	0.623	1.6e+07	0.289	

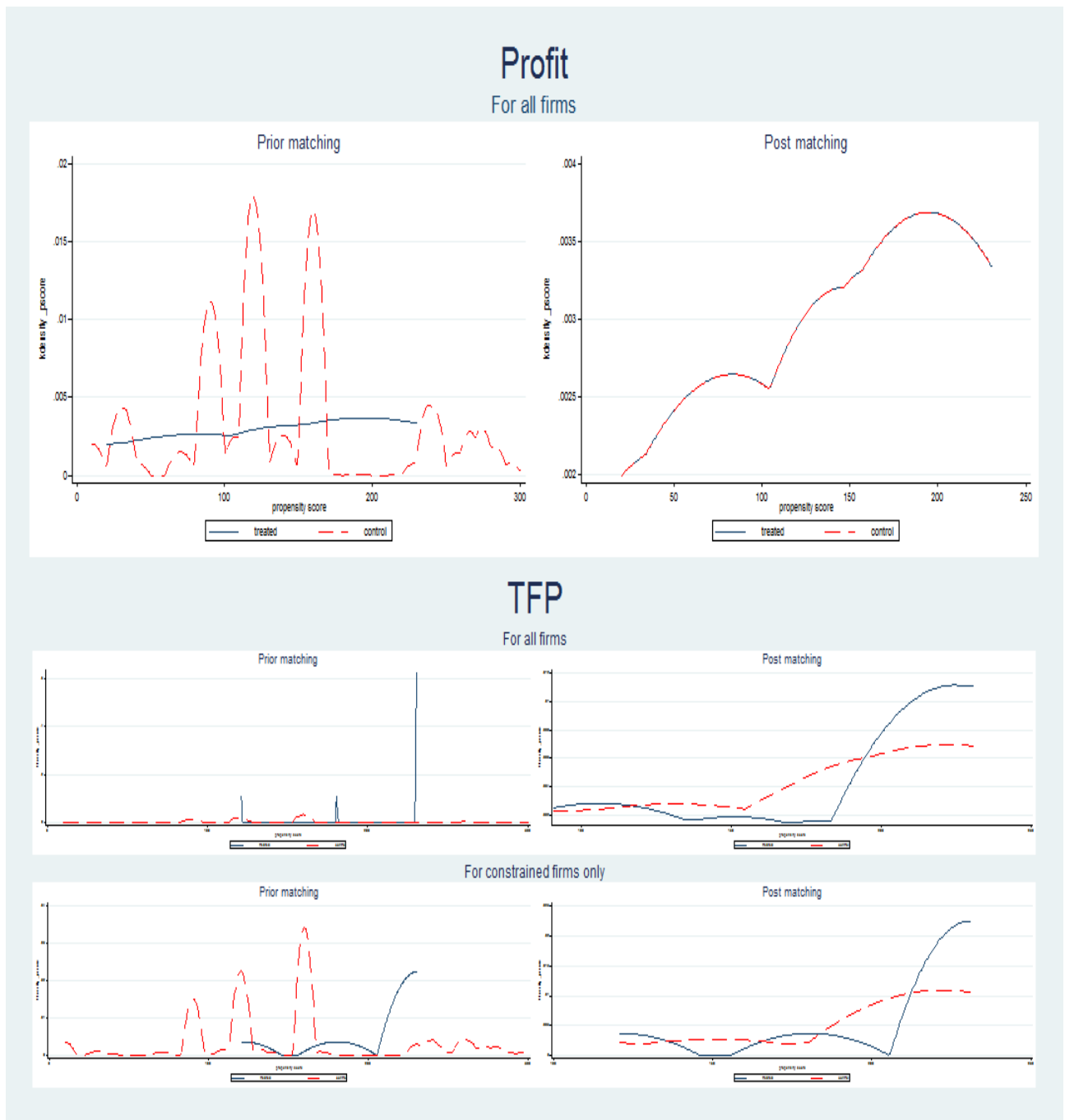
TABLE 12 – Comparison before the exact matching on the country

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	4.0e+05	1.4e+07	0.000	4.0e+05	2.0e+07	0.000
Long term debts	4.3e+05	2.3e+08	0.000	4.3e+05	3.5e+08	0.000
Solvency ratio	30.553	25.561	0.527	30.546	29.729	0.931
Work	19.168	1670.3	0.000	19.185	2432.6	0.000
Size	1.211	2.250	0.000	1.211	2.527	0.000
Capital	6.4e+05	1.4e+08	0.000	6.4e+05	1.9e+08	0.000
TurnoverEUt	9.1e+10	7.5e+10	0.312	9.1e+10	9.5e+10	0.858
FirmsEUt	6.9e+07	2.4e+07	0.000	6.9e+07	2.6e+07	0.000
	Employment					
Work	19.168	1670.3	0.000	19.185	2432.6	0.000
Investment	4.0e+05	1.4e+07	0.000	4.0e+05	2.0e+07	0.000
Long term debts	4.3e+05	2.3e+08	0.000	4.3e+05	3.5e+08	0.000
Solvency ratio	30.553	25.561	0.527	30.546	29.729	0.931
Size	1.211	2.250	0.000	1.211	2.527	0.000
Labor cost	705.740	569.540	0.363	705.720	577.380	0.479
FirmsEUt	6.9e+07	2.4e+07	0.000	6.9e+07	2.6e+07	0.000

TABLE 13 – Comparison after the exact matching on the country

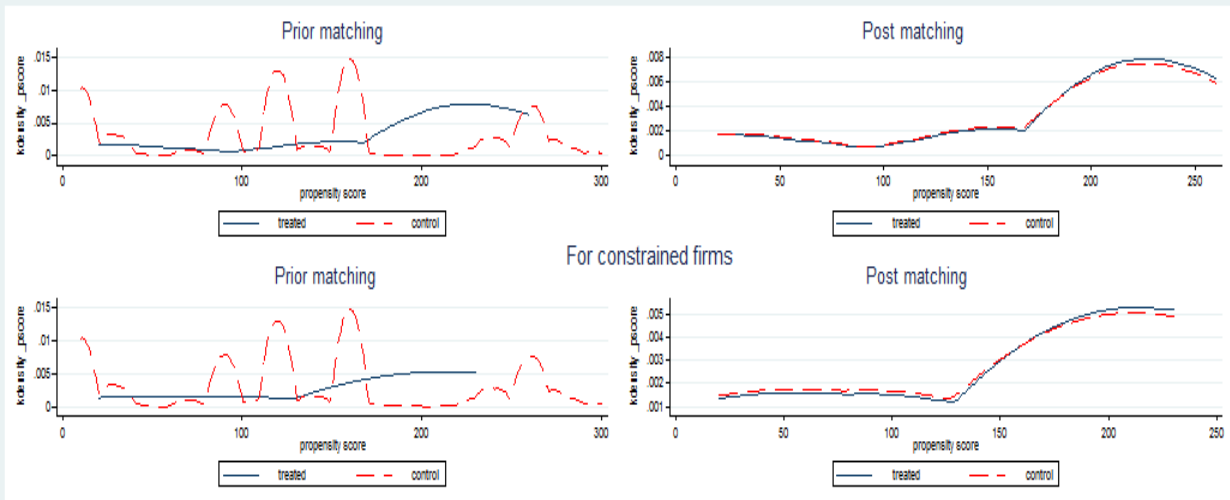
Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	7.8e+06	1.7e+07	0.266	1.2e+07	2.2e+07	0.640
Long term debts	4.2e+06	3.0e+06	0.332	6.4e+06	3.8e+08	0.336
Solvency ratio	38.850	30.475	0.356	58.341	32.568	0.027
Work	1159.8	3363.5	0.443	4259.2	1362.5	0.428
Size	3.786	2.500	0.445	3.363	2.818	0.059
Capital	2.2e+07	1.8e+08	0.334	3.1e+07	2.2e+08	0.343
TurnoverEUt	9.1e+10	7.5e+10	0.312	9.8e+10	1.0e+11	0.916
FirmsEUt	6.9e+07	2.4e+07	0.000	1.0e+07	1.8e++07	0.280
	Employment					
Work	96.111	869	0.178	962	948.880	0.986
Investment	1.5e+06	2.0e+06	0.120	1.3e+07	2.3e+06	0.207
Long term debts	5.5e+05	1.6e+06	0.361	8.1e+05	1.8e+06	0.825
Solvency ratio	22.988	10.034	0.292	25.108	25.145	0.997
Size	2.779	2.556	0.509	3.250	2.875	0.285
Labor cost	164.01	418.88	0.134	680.860	456.79	0.662
FirmsEUt	3.0e+07	1.5e+07	0.038	1.8e+07	1.6e+07	0.825

Comparisons hence tend to show that the match is of good quality. This is confirmed by the analysis of the densities after the matching process :



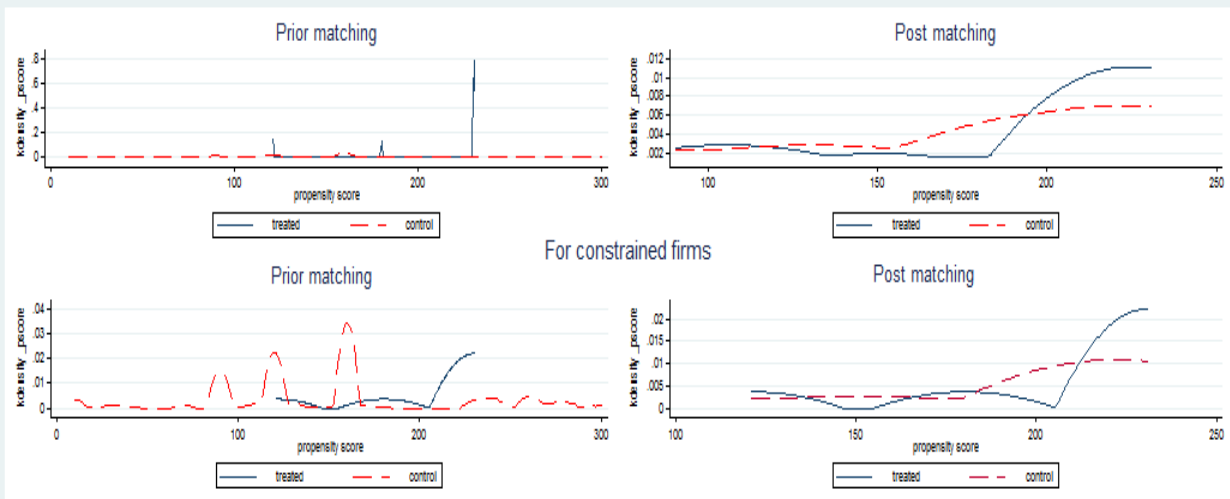
Investment

For all firms



Employment

For all firms



B Exact matching on the sector

We redo an exact matching analysis, but this time, the match will be found by choosing the firm which has the closest propensity score in the Nace sector of the aid. We of course suppress sectoral data (number of firms in the EU and turnover by sector) and redo all the Probit regressions without them (to get the propensity score). Results are summarized in table 14.

TABLE 14 – Probit exact matching on the sector

Variable	Production		TFP		Investment		Employment	
	All	Const.	All	Const.	All	Const.	All	Const.
Debts	0.000	0.000	0.000***	0.000	0.000**	0.000**	0.000	0.000**
Solvency ratio	-0.001	0.009	-0.012	-0.028***	-0.005	-0.005	-0.041***	-0.029
Employment	0.012***	0.014***	0.009**	0.009**	0.007**	0.006***		
Investment	0.000	0.000	0.000	0.000			0.000	0.000
Size	-1.114	-0.775	-0.397	0.991	-0.368	0.007	1.522**	1.479***
Capital	0.000***	0.000	0.000***	0.000	0.000	0.000		
Cash flow	0.000***	0.000***						
Long term interest			0.063	-0.057	0.062	0.044	-0.109	-0.099
Labor cost			-0.001**	-0.002**			-0.002**	-0.001**
TFP							0.000	0.000
Intercept	-1.024	-2.121	-0.893	-2.543	-1.620*	-2.279***	-1.878	-2.429

Significance level : * :10%; ** :5%; *** :1%

Results (reported in table 14) once again show that the main (and often only) drivers of the probability to get an aid is the number of employees of the potential recipient and its labor cost. It confirms that preserving jobs is certainly one of the major concerns of the European Commission and of member States when deciding whether to accept or refuse a restructuring State aid. Once again, we also have a positive impact of the past cash-flow when dealing with production. The higher it is, the more willing Member States and the European Commission are to allow an aid because the chance to become viable again is larger.

We find the same kind of results than in section 3 with propensity score matching or diff-in-diff, meaning that there is no real sectoral issues, and that the aid only has an impact on the TFP and workforce when we consider the country of the recipient. Results are reported in table 15.

TABLE 15 – Estimation of the mean effect of the aid on recipients’ performance, with exact matching on the sector

Performance indicator	Mean effect of the aid on all recipients	T-stat	Mean effect of the aid on constrained recipients	T-stat
Profit	-27671282.3	1.27	-	-
TFP	109653.599	0.84	127941.513	-0.06
Investment	15838339.1	-0.32	18281272.1	0.01
Workforce	794.7	0.35	951.26	0.91

Moreover, the matching process seems to be also correct with sectoral exact matching, because it leads to closer firms, as well as to closer propensity scores densities, as shown in the next tables and figures.

TABLE 16 – Comparison before the exact matching on the sector

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	1.5e+05	-1.7e+07	0.044			
Long term debts	2.1e+06	2.2e+08	0.001			
Solvency ratio	32.131	24.827	0.394			
Work	25.121	1696.3	0.000			
Investment	7.8e+05	1.4e+07	0.317			
Size	1.241	2.290	0.000			
Capital	5.4e+05	1.4e+08	0.000			
Operational cash-flow	6.6e+05	5.0e+07	0.008			
	Total Factor Productivity					
TFP	36315	32377	0.546	8648.9	1.1e+05	0.000
Long term debts	2.1e+06	2.2e+08	0.000	2.1e+06	3.2e+08	0.000
Solvency ratio	24.827	32.131	0.394	28.392	32.131	0.171
Work	25.121	1696.3	0.000	25.124	2578.2	0.000
Investment	7.8e+05	1.4e+07	0.317	7.8e+05	1.8e+07	0.000
Size	1.241	2.290	0.000	1.241	2.550	0.000
Capital	5.4e+05	1.4e+08	0.000	5.4e+05	1.9e+08	0.000
Labor cost	1213	728.41	0.180	1213	567.49	0.144
Long term interest rate	4.103	4.347	0.499	4.103	4.539	0.337

TABLE 17 – Comparison after the exact matching on the sector

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Profit					
Profit	-4.8e+06	-2.7e+07	0.419			
Long term debts	6.2e+06	5.9e+08	0.341			
Solvency ratio	35.837	32.015	0.840			
Work	453.86	5779.4	0.357			
Investment	1.9e+06	3.2e+07	0.351			
Size	2.571	2.571	1.000			
Capital	1.7e+07	3.2e+08	0.349			
Operational cash-flow	-2.7e+06	7.6e+07	0.323			
	Total Factor Productivity					
TFP	1.2e+05	1.2e+05	0.961	2.2e+05	1.3e+05	0.509
Long term debts	5.3e+05	1.6e+06	0.410	95718	1.8e+06	0.163
Solvency ratio	26.937	22.988	0.580	25.254	25.145	0.991
Work	573.56	869	0.630	685.63	948.88	0.703
Investment	1.9e+05	2.0e+06	0.127	2.9e+06	2.3e+06	0.369
Size	3.111	2.778	0.345	3.379	2.875	0.285
Capital	6.6e+06	2.8e+07	0.788	1.0e+06	3.2e+07	0.084
Labor cost	949.16	418.88	0.039	442.44	456.79	0.950
Long term interest rate	3.807	4.311	0.493	3.858	4.422	0.671

TABLE 18 – Comparison before the exact matching on the sector

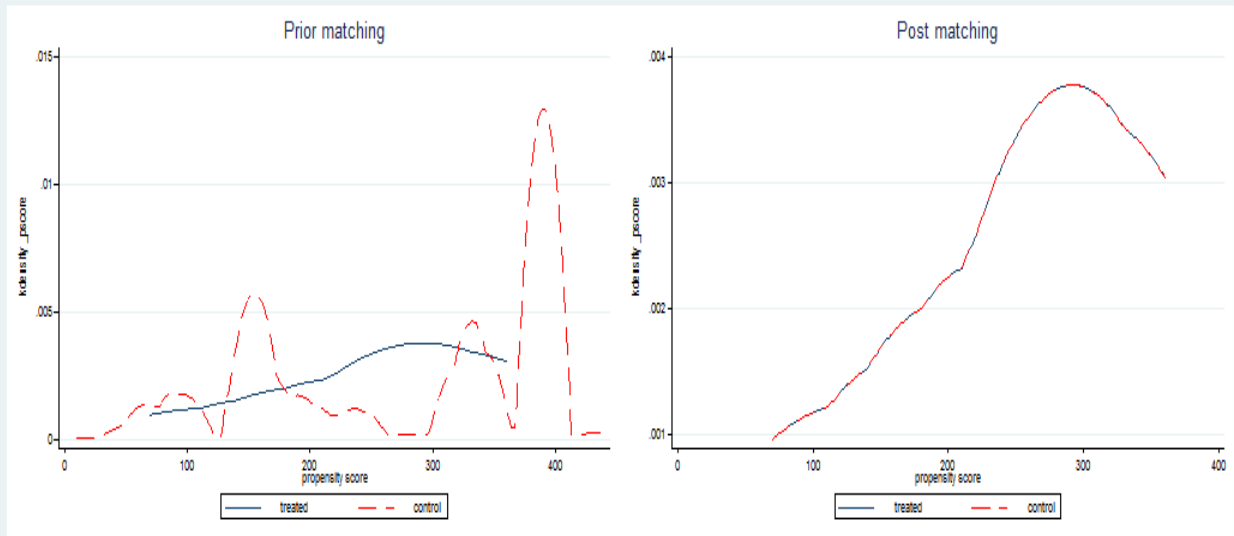
Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	7.8e+05	1.4e+07	0.317	7.8e+05	1.8e+07	0.247
Long term debts	2.1e+06	2.2e+08	0.001	2.1e+06	3.2e+08	0.000
Solvency ratio	32.131	24.827	0.394	32.131	28.392	0.711
Work	25.121	1696.3	0.000	25.124	2578.2	0.000
Size	1.241	2.290	0.000	1.241	2.55	0.000
Capital	5.4e+05	1.4e+08	0.000	5.4e+05	1.9e+08	0.000
Long term interest rate	4.103	4.347	0.499	4.103	4.539	0.331
	Employment					
Work	25.121	1696.3	0.000	25.124	2578.2	0.000
Investment	7.8e+05	1.4e+07	0.317	7.8e+05	1.8e+07	0.247
Long term debts	2.1e+06	2.2e+08	0.001	2.1e+06	3.2e+08	0.001
Solvency ratio	32.131	24.827	0.394	32.131	28.392	0.711
Size	1.241	2.290	0.000	1.241	2.550	0.000
Labor cost	1213	728.41	0.180	1213	567.49	0.104

TABLE 19 – Comparison after the exact matching on the sector

Variable	For all firms			For constrained firms only		
	Mean control	Mean recipient	P-value of the difference	Mean control	Mean recipient	P-value of the difference
	Investment					
Investment	2.3e+07	1.6e+07	0.738	1.8e+07	1.8e+07	0.993
Long term debts	3.5e+06	2.8e+08	0.300	9.0e+05	3.2e+08	0.3393
Solvency ratio	15.278	25.859	0.423	24.986	26.624	0.877
Work	513.07	3141.9	0.320	230.69	3727.4	0.252
Size	2.867	2.4	0.265	2.308	2.769	0.279
Capital	4.6e+06	1.6e+08	0.283	3.2e+06	2.769	0.279
Long term interest rate	5.201	4.362	0.499	2.957	4.493	0.055
	Employment					
Work	261.78	869	0.300	467.88	948.88	0.471
Investment	1.7e+06	2.0e+06	0.871	1.9e+05	2.3e+06	0.119
Long term debts	1.8e+06	1.6e+06	0.875	34496	1.8e+06	0.149
Solvency ratio	16.933	22.988	0.538	35.594	25.145	0.221
Size	2.667	2.778	0.694	3.125	2.875	0.513
Labor cost	438.911	418.88	0.920	373.05	456.79	0.683

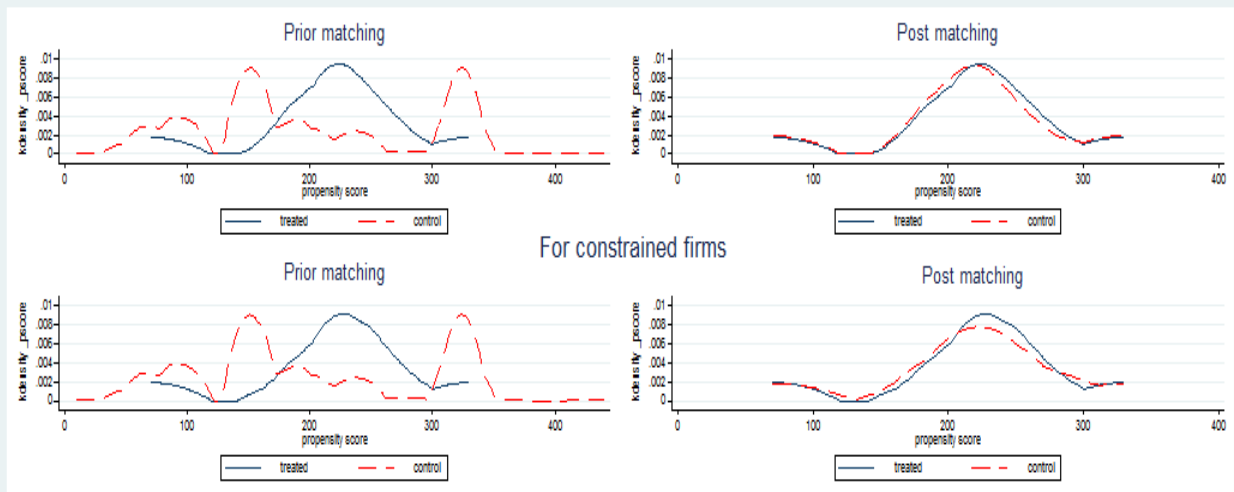
Profit

For all firms



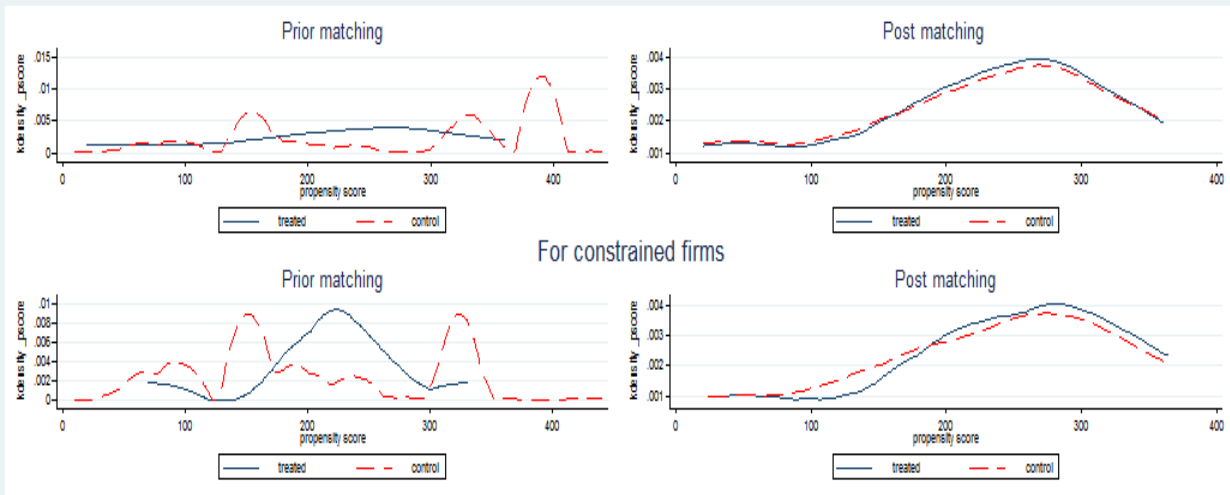
TFP

For all firms



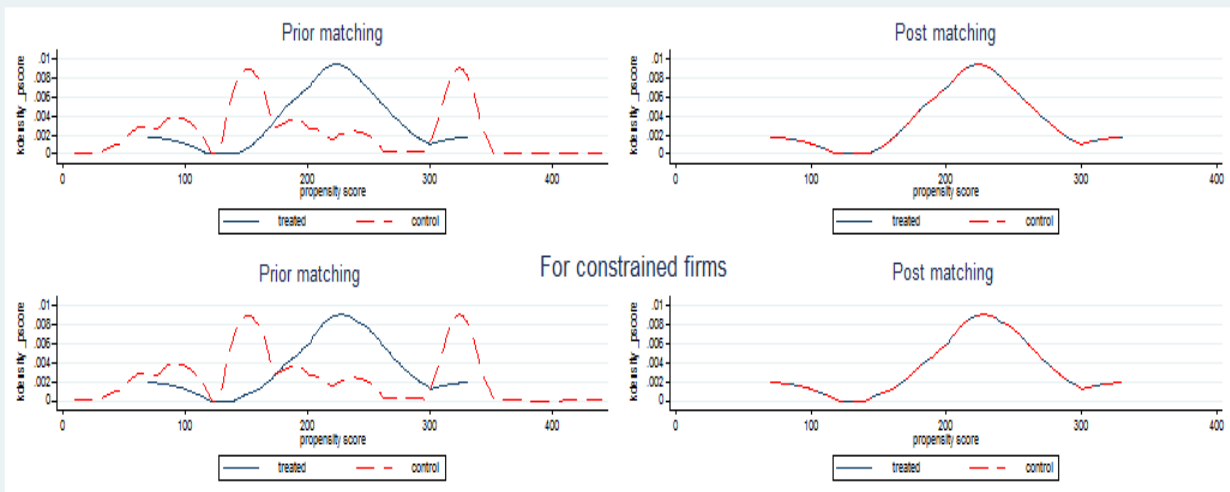
Investment

For all firms



Employment

For all firms



5 Conclusion

In this paper, we have tried to analyze the effect of the aid on recipients by implementing a counterfactual analysis. We have first observe through all the probit regressions (first stage of the matching) that firms' employment seems to be crucial to receive an aid. The higher it is, the more likely a firm is to benefit from an aid. Hence, the European Commission and Member States seem to favor employment and to have the goal of saving jobs when allowing restructuring State aids. According to both the propensity score matching, exact

matching on the sector and diff-in-diff, there is no significant impact of the aid on the performance of the recipient, even when the recipient is constrained on its production by compensatory measures. It seems to indicate that restructuring State aids are inefficient to help firms in difficulty.

However, when we check our results by implementing exact matching on the country, forcing the match to be in the same country that the recipient, we find that there is a positive and significant effect of the aid on the workforce and total factor productivity of recipients. Nevertheless, since this result is not holding for constrained recipients, we can make the assumption that State aids, in the better case, only have an impact on unconstrained recipients. This leads to several policy implications. First, restructuring State aids, in their current form, are useless since they do not lead to an improvement of recipients' performances. It would probably be more efficient to suppress production restrictions or to spend the public money for something else or with other instruments. Second, since there are national specificities, a more national control should be studied to see whether it can be more adapted for firms in difficulty.

Those results need to be improved by having a better control of national issues. Is there any other national or regional aid that may imply a cumulative effect? Do we have an influence of the political parties on the impact of restructuring State aids? We also need to pay more attention on the timing of the aid: can the absence of effect of restructuring aids come from the fact that State aids are allowed too late? That the procedure takes too much time? A third thing that we need to work on is also the control groups. Due to the differences on the variables introduced in the Probit, control groups are not the same for all performance indicators. This leads to less robust comparisons. Finally, we need to check if our results still hold when we introduce the restructuring plan of the recipient, since this one may impact the evolution of the firm regardless of the aid.

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6 Appendix

A Data specification

A.1 Comparison between the subsample and the entire control group

As discussed in section 1, we have randomly drawn a subsample of the population to implement the Probit without getting biased by the large number of firms in the control group compared to the small number of recipients. Table 20 makes a comparison between our subsample and the entire database, showing that there are no significant differences between the two.

A.2 Description of variables

The following table is describing more precisely the data that we are using.

TABLE 20 – Comparison between the subsample and the entire database

Variable	Mean subsample	Mean entire database	P-value of the difference
TFP_t	99353	62292	0.112
$Long\ term\ debts_t$	1.5e+07	2.2e+06	0.457
$Solvency\ ratio_t$	33.359	32.129	0.394
$work_t$	68.068	25.13	0.139
inv_t	8.9e+05	7.8e+05	0.969
$size_t$	1.2605	1.24093	0.228
$capital_t$	6.8e+06	5.4e+05	0.101
$Long\ term\ interest_t$	4.106	4.1034	0.969
$Labor\ cost_t$	1158.4	1213	0.470
$FirmsEU_t$	6.2e+07	2.2e+06	0.563
$TurnoverEU_t$	9.4e+10	1.0e+11	0.134
$Operational\ cash\ flow_t$	2.0e+06	6.6e+05	0.704
$profit_t - 8.0e+05$	1.6e+05	0.528	

TABLE 21 – Description of variables

Variable	Description	Mean	Source
Capital	Issued share capital	551052.4	Amadeus
CM	Compensatory measures : 1 means no compensatory measures, 2 means indirect ones, 3 means direct one	1.139922	European Commission
Investment	Evolution of the total amount (after depreciation) of non-current assets for firms (intangible assets + tangible assets+ other fixed assets)	780727.3	Amadeus
Long term interest rate	long term interest rate per country	4.103439	OECD
Long term Debts	Long term financial debts	2170779	Amadeus
Labor cost	Personnel costs in the EU= total remuneration, in cash or in kind, payable by an employer to an employee (regular and temporary employees as well as home workers) in return for work done by the latter during the reference period	1212.946	Eurostat
Nfirms	Number of firms per sector in the EU	6.25e+07	Eurostat
Operational cash flow	Firms' profit for period + depreciation	665847.3	Amadeus
Profit	Firms' profit (i.e. net revenue)	168161.3	Amadeus
Size	size of firms, according to their labor and profit	1.24095	Amadeus
Solvency ratio	(Shareholders funds/Total assets)*100	32.13092	Amadeus
TurnoverEU	Sectoral turnover in the EU (or gross premiums written)	1.03e+11	Eurostat
TFP	Total factor productivity computed through the Petrin and Levinsohn (2004) method	32388.07	
Workforce	Number of employees per firm	25.19686	Amdeus