

APPLIED MICROECONOMETRICS - ECON 4008

GROUP PROJECT A

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# The Effect of FDI on Firm Productivity - A Propensity Score Estimation Approach

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# 1. Introduction

The understanding of potential effects of Foreign Direct Investment (FDI) on a firm's productivity is of major concern to policy makers. FDI is commonly associated with higher firm productivity (Girma and Görg, 2007). Recent literature trying to identify the causal mechanisms underlying this correlation has stressed the difficulties to pin down the size and direction of the relationship. Most argue that foreign investment positively impacts firm productivity. However, it is also possible that foreign investors choose more productive firms (Arnold and Javorcik, 2009).

The identification of the causal effect of FDI on a firm's performance, and in particular on its total-factor productivity (TFP) requires the counterfactual outcome. Although it is inherently unobservable, different methods can be used to take into account the biases stemming from this missing data problem, e.g. randomization, Difference-in-Differences (DiD), as well as Instrumental Variable and Propensity Score methods (Karpaty, 2007). A common method in the economic literature regarding the effects of FDI combines DiD with Propensity Score-based estimation. The latter is used in order to compare treated to untreated firms which are similar in their likelihood of receiving treatment, given a set of observable pre-treatment characteristics. DiD estimation on the other hand accounts for unobservable firm characteristics that are constant over time. Estimations combining both methods are expected to provide a robust Average Treatment Effect (ATE).

This methodology is used by Arnold and Javorcik (2009); Karpaty (2007); Girma and Görg (2007) and Schiffbauer et al. (2017). Arnold and Javorcik (2009) find a positive and persistent effect of FDI on firm productivity, estimating a 13.5% increase in productivity of treated firms after three years. Karpaty (2007) finds a positive effect of foreign acquisitions on productivity of Swedish manufacturing plants, ranging between 7 and 8 percent for the DiD estimators. However, it took up to five years for productivity differences to occur. Girma and Görg (2007) use plant-level data from the UK's electronics and food industries and find substantial heterogeneity across industries, especially with respect to the onset of positive effects on TFP growth. Koch and Smolka (2019) combine DiD with Inverse Propensity Score Weighting (IPW). They use Spanish firm level data, providing evidence of an increase in output of ten percent, which is explained almost entirely through skill upgrading caused by foreign acquisition.

Using various propensity score estimators, we investigate the effect of FDI on TFP for a sample of 11,323 firms. In line with previous research, we identify a statistically and economically significant effect of FDI on firm productivity, with an ATE between 12 and 15 percent of a standard deviation. This result is robust to various model specifications,

although there seems to be some heterogeneity of the effect across different levels of technology intensity. We also examine the effects of the specific types of FDI, but find no evidence of differences in their impact on firm productivity.

The remainder of this paper is organized as follows: The data and empirical specification are presented in sections 2 and 3, respectively. The results and robustness checks are shown in section 4. Section 5 concludes.

## 2. Data and Descriptive Analysis

Our analysis is based on observational firm-level data from 2015 to 2017. The dataset comprises 11,323 firms, of which 4,460 received FDI in 2016. FDI can be divided into three subcategories. Table 1 shows the frequencies of each type of FDI in our sample. Among the recipients of FDI, most firms (1,965) received domestic market seeking FDI. 1,555 firms received technology intensive FDI and the remaining 640 firms received exports oriented FDI. The outcome variable TFP was measured in 2017, the year after treatment. We standardize TFP to a mean of zero and a standard deviation of one, making the interpretation more intuitive.

Table 1: Frequency of FDI Types

FDI type	Abs. Freq.	Rel. Freq.
No FDI	6,863	61%
Exports oriented FDI	940	8%
Technology intensive FDI	1,555	14%
Domestic market seeking FDI	1,965	17%
Total	11,323	100%

A set of categorical and continuous control variables was measured in 2015, one year prior to the firms receiving FDI. Table 2 provides an overview of the categorical variables and their frequencies in our sample. The port variable indicates whether a firm has access to a port within 500km. The legal ownership of a firm is captured in the ownership variable. The technology intensity of the industry the respective firm is operating in, is measured in four categories from low- to high-tech. The R&D dummy indicates whether a firm has invested in Research and Development in 2015.

Table 2: Summary Statistics of Categorical Covariates

	Abs. Freq.	Rel. Freq.
<b>Port<sup>a</sup></b>		
No	7,366	65.05
Yes	3,957	34.95
<b>Ownership</b>		
Listed company	909	8.03
Subsidiary	2,630	23.23
Independent	4,593	40.56
State owned	3,191	28.18
<b>Technology Intensity</b>		
Low-tech	4,194	37.04
Medium low-tech	1,685	14.88
Medium high-tech	3,539	31.25
High-tech	1,905	16.82
<b>R&amp;D<sup>b</sup></b>		
No	9,951	87.88
Yes	1,372	12.12

<sup>a</sup> Indicates whether a firm has access to a port within 500km.

<sup>b</sup> Indicates whether a firm has invested in R&D in 2015.

Table 3: Summary Statistics of Continuous Covariates

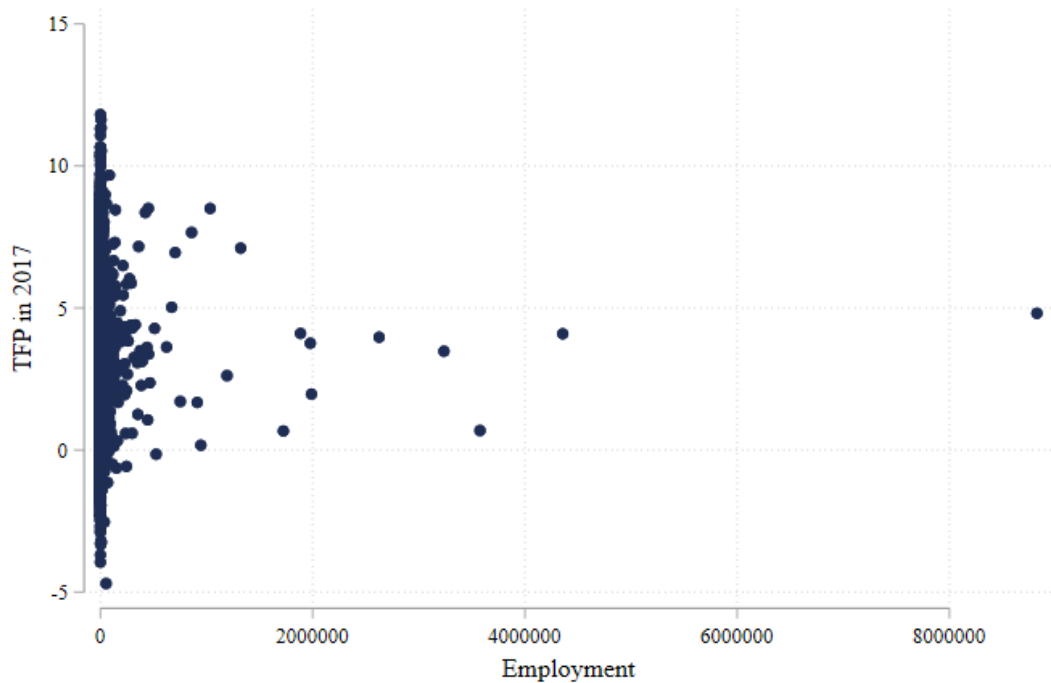
	Mean	Median	Sd	Min	Max
Wages	1,967 <sup>a</sup>	1,538	50,990 <sup>a</sup>	0.00065	5,519,000 <sup>a</sup>
TFP	3.041	3.032	2.047	-5.359	11.36
Employment	7,111	81.39	117,155	0.00197	8,824 <sup>a</sup>
Debt	1.762	1.649	0.634	0.819	3.668
Export intensity	0.159	0.154	0.0798	0.0103	0.483

*Note:* All variables in levels.

<sup>a</sup> In Thousands

The summary statistics of the continuous variables, i.e. wages, total-factor productivity (TFP), firm size<sup>1</sup>, debts and the firms' export intensity are displayed in Table 3. The variables wages and employment and, to a lesser extent, debts show large differences between their mean and median values. To reduce the influence of extreme values potentially causing this divergence one can take the logarithm of these variables. However, including the log transformed employment variable yields worse covariate balance in all estimated models. We therefore include the untransformed employment variable in the subsequent analysis, despite noting at least one extreme value in this variable (see Figure 1). We test the robustness of our models to the exclusion of observations with extreme values in the employment variable in section 4.

Figure 1: Outliers in Employment Variable




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<sup>1</sup>Since the original variable is only available in logarithmic form and lacks an indicator for the unit of measurement we assume it is measured in number of employees.

To further motivate the use of propensity scores in estimating the effect of FDI on a firm's TFP, we show the differences in means between firms that received FDI and firms that did not in Table 4. The t-tests show significant differences in all observable characteristics, suggesting that there might be selection into treatment.

Table 4: Difference in Pre-Treatment Covariate Means

	(1) Control	(2) Treatment	T-test Difference (1)-(2)
Technology intensity	2.565 (0.014)	1.838 (0.015)	0.728***
Access to port	0.273 (0.005)	0.467 (0.007)	-0.194***
Log wages	7.529 (0.046)	7.031 (0.057)	0.498***
TFP	3.185 (0.025)	2.821 (0.030)	0.364***
Log employment	3.766 (0.037)	5.405 (0.041)	-1.639***
Log debts	0.511 (0.004)	0.493 (0.005)	0.019***
Export intensity	0.131 (0.001)	0.204 (0.001)	-0.073***
R&D dummy	0.117 (0.004)	0.128 (0.005)	-0.012*
Observations	6863	4460	

*Notes:* Columns (1) and (2) show the pre-treatment covariate means of the control and treatment group respectively. Standard errors are displayed in parentheses. The values displayed for t-tests are the differences in the means across the groups. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level.

### 3. Empirical Specification

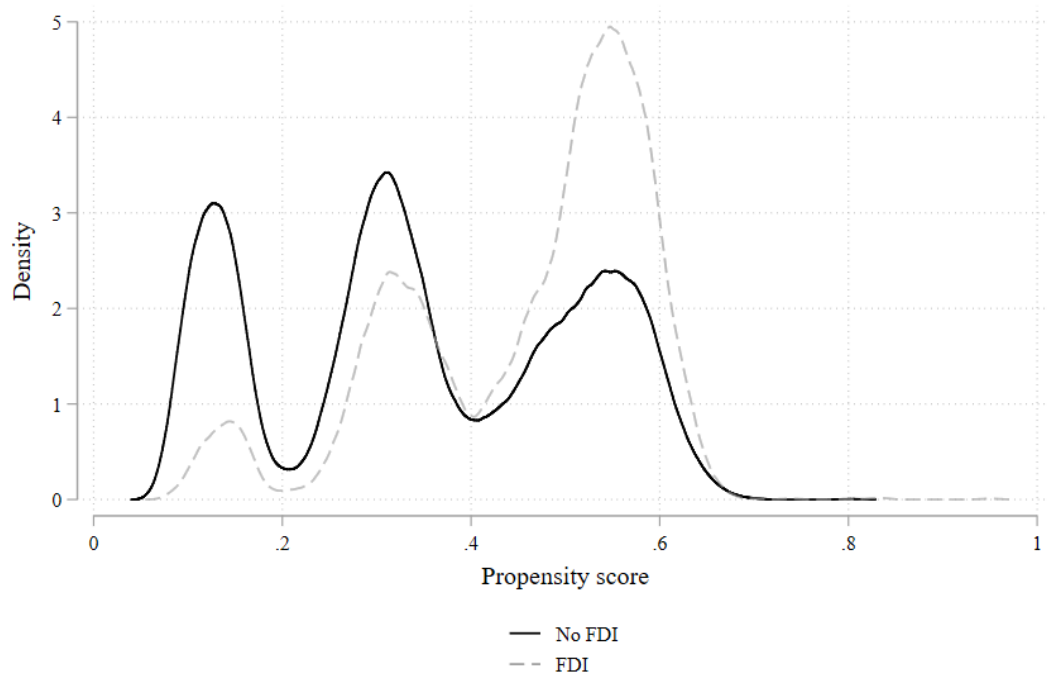
If FDI was not randomly assigned to firms, a simple comparison of treated and untreated firm outcomes would yield a biased treatment effect. Instead, we use propensity score estimation to compare the outcomes of similar firms. For this purpose we estimate the likelihood of treatment for each firm, i.e. the propensity score. It is based on a set of observable characteristics that influence both the outcome and the likelihood of treatment.



We assume that conditional on these confounders, the treatment is independent of the potential outcome, i.e. the Conditional Independence Assumption (CIA) is satisfied.

Our propensity score is estimated via a logit regression of the binary treatment variable on ownership, technology intensity, a Research&Development dummy, the logarithm of wages, TFP, employment and debts in 2015. We use the same specification of covariates for all estimators, unless stated otherwise. We do not include the export variable as a matching covariate, assuming that exports do not increase firm productivity. Only covariates that influence the likelihood of treatment and the outcome of interest need to be included (?). Although there is some debate about the direction of causality between exports and productivity, Wagner (2007) argues in his literature review that productivity increases exports, but not the other way around. The exclusion of the export variable significantly improves covariate balance. We do not include the port variable for the same reason. Figure 2 shows evidence of sufficient propensity score overlap for a matching analysis. The covariate balances of the different models is discussed in more detail below.

Figure 2: Propensity Score Overlap in Main Model



The first two models are estimated using the nearest-neighbour matching with replacement. The outcomes of treated observations are compared to those of the closest control observations in terms of propensity scores. We estimate these models with one and five nearest neighbours, respectively. For the latter we add a caliper cutoff at 0.05. We also fit inverse probability weighting models (IPW), which weigh observations by the inverse probability of being in their observed treatment group. Further, we estimate the treatment effect using the augmented inverse probability weighting model (AIPW), which adds covariate adjustment to the weighting. Thus, as long as either the propensity score or the covariate adjustment model is correctly specified, the results of the AIPW are unbiased (Imbens and Rubin, 2015, p. 393). The point of using multiple estimators is to ensure that the investigated effect is robust to the use of different estimation methods.

## 4. Results

### 4.1. Effect of FDI on TFP

The main findings of this paper are displayed in Table 5. It reports the Average Treatment Effects of FDI on TFP. Across different estimators we find large and highly significant coefficients, indicating that receiving FDI increases TFP of companies on average. The reported coefficients differ only slightly in magnitude.

Table 5: ATE of FDI on TFP

	NN1 (1)	NN5 (2)	IPW (3)	AIPW (4)
FDI2016	0.130*** (0.015)	0.114*** (0.011)	0.122*** (0.007)	0.142*** (0.003)
PO Means			-0.068*** (0.010)	-0.057*** (0.009)
Observations	11,323	11,318	11,323	11,323

*Note:* This table reports the standardized coefficients of several matching estimators. All matching was done with replacement. Columns (1) and (2) show the coefficients of the one and five nearest neighbour propensity score matching respectively. For the NN5 matching, a caliper was set to .05. Columns (3) and (4) display the coefficients of the inverse probability and augmented inverse probability matching estimators respectively. The covariate adjustment model specification is the same as that of the propensity score model. Standard errors are displayed in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level.

Column (1) shows the results of a one-to-one propensity score matching with replacement. Had all firms in our sample received FDI, the TFP would have increased by 13 percent of a standard deviation on average. Slightly lower results are obtained from a propensity score matching with five nearest neighbors and a caliper of 0.05 in column (2). The caliper cutoff excluded five observations. The estimate of the IPW in column (3) is also somewhat below that of column (1). The estimate of the doubly robust AIPW-estimator is slightly larger than that of the first model, but all estimates differ by no more than 3 percent of a standard deviation.

Checking the covariate balances of our models, the standardized differences and variance ratios are within a very good range for all models. We prefer the one-to-one propensity score matching as it gives us the best covariate balance of all the estimators. The maximum standardized difference among all covariates is four percent and the largest variance ratio is 1.7, with all others being close to one (see A.2).

## 4.2. Robustness of Results

### Alternative Specifications

In order to test for the sensitivity of our main findings to alternative model specifications, we perform several robustness checks for the nearest-neighbour matching estimator with one neighbour. The results are reported in Table 6. The positive and significant effect of FDI on TFP persists through all specifications, confirming our main results that foreign investment increases the productivity of domestic firms. In column (1), we add interaction terms of the dummy variables with the continuous regressors to our set of covariates. This is widely practiced to improve covariate balance (Caliendo and Kopeinig, 2008). However, in our case we do not find notable improvements but worse balances for some covariates. In fact, the covariate balance of the included interaction terms was not within an acceptable range.<sup>2</sup> The estimated ATE of FDI on productivity slightly increases by 0.022 standard deviations compared to the effect reported in column (1) of Table 5.

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<sup>2</sup>The same holds true when interacting only dummy variables, only continuous variables or all variables.

Table 6: Robustness of Results

	Including Interactions (1)	Excluding Outliers (2)	Including Port (3)	Effect on the Treated (4)
ATE	0.152*** (0.016)	0.127*** (0.015)	0.125*** (0.019)	
ATT				0.127*** (0.017)
Observations	11,323	11,321	11,323	11,323

*Note:* All specifications are variations of our main model using the Propensity Score Matching method with one nearest neighbour and replacement. Covariates in the main model included: Ownership, Technology Intensity, Research&Development, logarithm of Wages, Total Factor Productivity, Employment and Debts. In column (1), the main model is augmented by interactions of the dummy variables (Ownership, Technology Intensity, Research & Development) with continuous variables (Logarithm of wages, Total Factor Productivity, Employment and Debts). The specification in column (2) excludes two observations with values of Employment 2015 above four million. In column (3) we include a dummy variable indicating whether a port lies within 500km of the firm as an additional covariate. Column (4) reports the average treatment effect on the treated. Standard errors are displayed in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level.

As we decided not to log transform the employment variable, our results could further be biased by its outliers (see Figure 1). While most of the firms' employee numbers are concentrated around the mean of 7,111, we are concerned about two observations with extreme values, with eight and four million employees respectively. To check whether these outliers influence our main findings, we restrict the sample to firms with less than four million employees. The results reported in column (2) show no significant change in the treatment effect when excluding the two extreme observations.

We have also assumed that the presence of a port within 500 km of the firm does not influence productivity. Although one could argue that having access to a port might increase productivity e.g. by facilitating market access, we find no evidence of this. Column (3) reports only a small change in the estimate of 0.5 percent of a standard deviation when including the port dummy in our set of covariates.

Column (4) reports the Average Treatment Effect on the Treated (ATT) of the propensity score matching with one neighbor and replacement. While the ATE measures the average effect of FDI for the hypothetical case that all firms received FDI, the ATT estimates the effect only on those firms that actually received treatment. Because selection into treatment is non-random, we might find different effects of treatment on

the treated. It could, for example, be higher if those firms receiving treatment are also the ones benefiting more from it in terms of productivity. However, our estimate in column (4) reports an ATT that is very similar to the average treatment effect. This suggests that although there was selection into treatment, our propensity score model yields similar results as under randomization, where ATE and ATT are equal.

### Effects by Technology Intensity

FDI flows vary strongly between different sectors (see, for example, Javorcik (2004); Keller and Yeaple (2009); Haskel et al. (2007)). In our sample, firms are divided into four industry groups, ranging from low-tech to high-tech industries. While foreign investors target only 13 percent of firms in high-tech industries, more than half of the firms in low-tech industries have received FDI in 2016.<sup>3</sup> Empirical evidence suggests that the effect of FDI on firm productivity is heterogeneous, depending on a firm's technology intensity. For instance, Keller and Yeaple (2009) find a strong effect of FDI on the productivity of domestically owned firms in the high-tech sector but only a very small, if any, effect on low-tech industries. To test for this possibility, we estimate the ATE of FDI on productivity separately for each industry and report the results in Table 7. Standard errors have increased slightly, but the results are still highly significant.

Table 7: ATE by Technology Intensity of Industry

	Low-Tech Industry (1)	Medium Low-Tech Industry (2)	Medium High-Tech Industry (3)	High-Tech Industry (4)
FDI2016	0.160*** (0.020)	0.086*** (0.028)	0.172*** (0.019)	0.180*** (0.054)
Observations	4,194	1,685	3,539	1,905

*Note:* The table reports the standardized ATE coefficients for subsamples of firms with different levels of technology intensity. Standard errors are displayed in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level.

The impact of FDI does indeed vary across industries. Our estimates support the finding of Keller and Yeaple (2009) that firms in high-tech industries benefit the most, as FDI increases productivity of these firms by 18 percent of a standard deviation, five

<sup>3</sup>See Appendix A.1.

percentage points more than our results for the full sample would suggest. Somewhat surprising is that the estimates for the low-tech industry are also higher than in our main specification. The medium low-tech industry, instead, benefits much less than the other industries. It experiences an increase in TFP of only 8.6 percent of a standard deviation when receiving FDI.

The weighted average of these estimates yields an ATE of FDI on TFP of 0.158 standard deviations.<sup>4</sup> This effect slightly differs from our main result due to the fact that matching is now performed within industry only. Although matched neighbours might be more 'distant' regarding other covariate values, we can ensure that each treated firm is allocated to a control observation with the same technology intensity. Despite the smaller sample sizes, the covariate balances remain good overall.

### 4.3. Analysis by Type of FDI

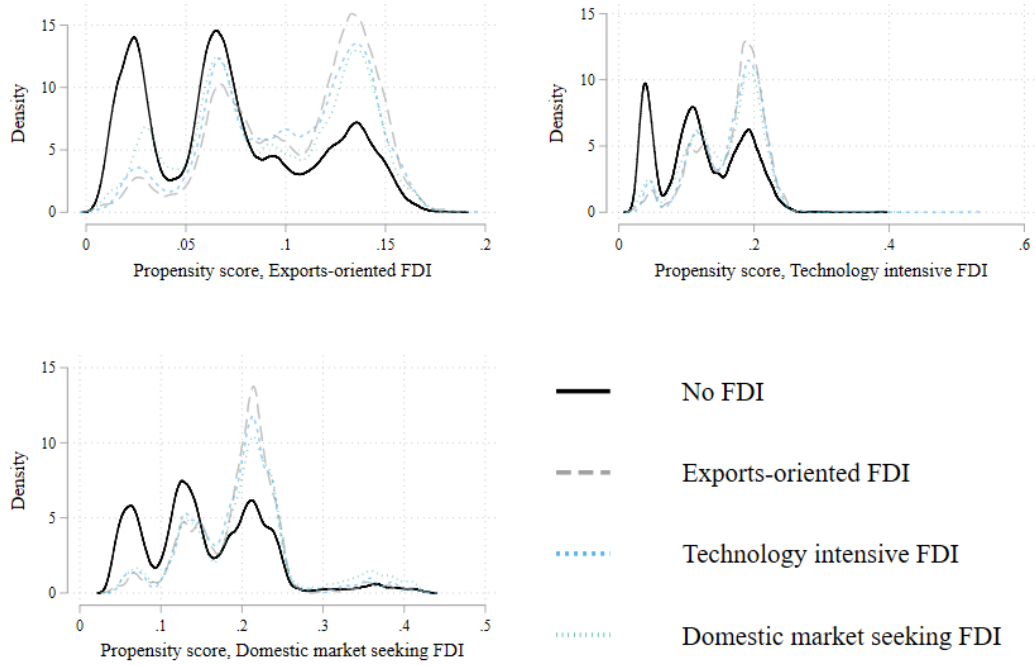
We continue our analysis by looking at potential heterogeneity of the treatment effect across types of FDI. We test the possibility that one specific type of investment single handedly drives our previous results. It is possible that, for example, only exports-oriented FDI increases factor productivity while the other two types have little or no impact. This would violate the Stable Unit Treatment Value Assumption (SUTVA), necessary for causal effect stability.

We estimate an augmented IPW model with multi-valued treatment effects. The propensity score and regression adjustment model specifications are the same as that of our main model. The model yields good covariate balance (see A.2). We further estimate an IPW model to check if it returns similar estimates without regression adjustment. The covariate balance in this model is practically the same. Finally, we specify a set of AIPW models, each comparing only one type of treatment to non-treated observations. This allows for the IIA assumption to be relaxed which is required for multinomial logit models. The separate models have worse covariate balance than the multinomial ones but are still acceptable. The overlap assumption is satisfied for all treatment levels as can be seen in Figure 3.

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<sup>4</sup>Weights are allocated according to relative subsample size.

Figure 3: Propensity Score by Treatment Level



In Table 8 the results from the type-wise analysis are shown. In the AIPW multinomial specification, the ATE of different types of FDI are within half a percent of each other. This suggests that all types of FDI increase factor productivity by the same margin. The estimated effect size is close to the one estimated for FDI in Table 5. In the IPW specification the differences are slightly larger but still within five percent of a standard deviation of each other. The separate logit models also yield essentially the same effect sizes as the multinomial specification. Since the AIPW estimator is doubly robust, assuming correctly specified covariate adjustment models, the results in columns (1) and (3) provide us with strong evidence of homogenous effects of different FDI Types on TFP.

Table 8: ATE by Type of FDI

	(1) AIPW Mlogit	(2) IPW Mlogit	(3) AIPW Logit	(4) AIPW Logit	(5) AIPW Logit
Exports-oriented FDI	0.144*** (0.006)	0.157*** (0.032)	0.140*** (0.007)		
Technology intensive FDI	0.139*** (0.005)	0.112*** (0.018)		0.139*** (0.005)	
Domestic market seeking FDI	0.143*** (0.004)	0.134*** (0.011)			0.143*** (0.004)
PO Means	-0.057*** (0.009)	-0.068*** (0.010)	-0.012 (0.011)	-0.025** (0.011)	-0.017 (0.011)
Observations	11,323	11,323	7,803	8,418	8,828

*Note:* Columns (1) and (2) report the coefficients of the multinomial augmented inverse probability and multinomial inverse probability matching estimators respectively. Columns (3)-(5) display the results of the augmented inverse probability matching estimator for subsamples of firms having received different types of FDI. Standard errors are displayed in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1, 5, and 10 percent critical level.

## 5. Conclusion

Using Propensity Score-based estimators, we find a positive, economically and statistically significant effect of FDI on firm productivity. This effect is robust across various estimators as well as to different model specifications. We find evidence of heterogeneity across technology levels, however, this effect is not linearly increasing with technology intensity. The treatment effect is essentially the same for all types of FDI.

While our findings are broadly in line with the empirical literature, our ability to contextualize our results is limited by the lack of information about our data. For example, our dataset does not provide the geographical location of firms. The effect of FDI on TFP might be different in developed and less developed countries. Moreover, we lack a detailed industry classification of firms. We are thus unable to account for spillover effects on nearby firms or on firms within the same industries. This may lead to an underestimation of the ATE.

A DiD-Matching combination would have further allowed us to control for unobservable firm characteristics, however, this would exceed the scope of our analysis. Finally,



as mentioned in the literature review, the effects of FDI can change over time. We can only report estimates of the initial impact of FDI on TFP in the year after treatment. Thus we cannot make any claims about the persistence of the effect.

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## A. Appendix

### A.1. Treatment by Technology Intensity

	Control Group			Treatment Group		
	(1)	(2)	(3)	(4)	(5)	(6)
	Abs.	Rel.(%)	Cum.(%)	Abs.	Rel.(%)	Cum.(%)
<b>Technology Intensity</b>						
Low-tech	1869	44.6	27.2	2325	55.4	52.1
Medium low-tech	904	53.6	40.4	781	46.4	69.6
Medium high-tech	2432	68.7	75.8	1107	31.3	94.5
High-tech	1658	87.0	100.0	247	13.0	100.0
<b>Total</b>	<b>6863</b>	<b>60.6</b>		<b>4460</b>	<b>39.4</b>	

*Note:* This table reports firm technology intensity by treatment status. The first three columns respectively display the absolute and relative frequencies, as well as the cumulative within-group relative frequencies for the control group. The same parameters are reported in columns (4)-(6) for the group of firms that received FDI in 2016.

## A.2. Stata Output

Sunday May 10 20:57:05 2020 Page 1



```
name: <unnamed>
log: C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometri
> cs\fdimatching_deleteEXP\log_fdi_matching.smcl
log type: smcl
opened on: 10 May 2020, 20:53:51

1 . clear all

2 .
3 . *-----*
4 . * PART 1.0: Download Packages
5 . *-----*
6 .
7 . // package gr0070 from http://www.stata-journal.com/software/sj17-3
8 . cap ssc install gr0070

9 .
10 . // package outreg2
11 . cap ssc install outreg2

12 .
13 . // package tabout
14 . cap ssc install tabout

15 .
16 . *-----*
17 . * PART 1.1: Set globals for do-file routines
18 . *-----*
19 .
20 . global input "$root/01_input"
21 . global scripts "$root/02_scripts"
22 . global log "$root/03_log"
23 . global results "$root/04_results"

24 .
25 . use "$input/FDI_project"

26 .
27 .
28 . *-----*
29 . * PART 1.2: Adjust variable labels
30 . *-----*
31 .
32 . label var OWN "Ownership"
33 . label var TECH "Technology intensity"
34 . label var PORT "Access to port"
35 . label var logwages2015 "Log wages"
36 . label var TFP2015 "TFP"
37 . label var logemp2015 "Log employment"
38 . label var DEBTS2015 "Log debts"
```

```

39.      label var EXP2015 "Export intensity"
40.      label var RD2015 "R&D dummy"
41.      label var logwages2017 "Log wages"
42.      label var TFP2017 "TFP"

43.
44. *-----*
45. *      PART 1.3: Transforming variables
46. *-----*
47.
48.      generate TFPS17= (TFP2017-3.656046)/2.056464
49.      generate emp2015= exp(logemp2015)
50.      generate wages15 = exp(logwages2015)
51.      generate debts15 = exp(DEBTS2015)
52.
53.      save $input/fdi_matching_clean, replace
54.      file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdima
55.      > tching_deleteEXP\01_input\fdi_matching_clean.dta saved

54.
55. *-----*
56. *      PART 1.4: Set globals for variables
57. *-----*
58.
59.      global F "OWN TECH RD2015"
60.      global C "logwages2015 TFP2015 emp2015 DEBTS2015"

61.
62. *****
63. *      PART 2: Descriptive Analysis
64. *****
65.
66.      do $scripts\02_Descriptive_Analysis

67. /*****
68. >      DESCRIPTIVE ANALYSIS DO-FILE
69. > *****
70. >
71. >      Applied Microeconometrics
72. >
73. >      Empirical Project
74. >
75. >      Do-File 02
76. >
77. >      PURPOSE:      Analysis of Dataset
78. >
79. >      OUTLINE:      PART 1: Overview
80. >                   PART 2: Summary Statistics
81. >                   PART 3: Balance Tables
82. >
83. > *****
84. >      PART 1: Overview
85. > *****/

```

```

68.
69. describe

Contains data from C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microecon
> ometrics\fdimatching_deleteEXP\01_input\fdi_matching_clean.dta
  obs:      11,323
  vars:      21
  size:    713,349
                                10 May 2020 20:54

```

variable name	storage type	display format	value label	variable label
<b>firm</b>	float	%9.0g		<b>firm identifier</b>
<b>FDI2016</b>	byte	%9.0g		<b>FDI/TREATMENT dummy in 2016</b>
<b>FDIYPE2016</b>	byte	%28.0g	FDIYPE	<b>FDI type</b>
<b>OWN</b>	byte	%17.0g	OWN	<b>Ownership</b>
<b>TECH</b>	byte	%27.0g	TECH	<b>Technology intensity</b>
<b>PORT</b>	byte	%21.0g	PORT	<b>Access to port</b>
<b>logwages2015</b>	float	%9.0g		<b>Log wages</b>
<b>TFP2015</b>	float	%9.0g		<b>TFP</b>
<b>logemp2015</b>	float	%9.0g		<b>Log employment</b>
<b>DEBTS2015</b>	float	%9.0g		<b>Log debts</b>
<b>EXP2015</b>	float	%9.0g		<b>Export intensity</b>
<b>RD2015</b>	byte	%9.0g		<b>R&amp;D dummy</b>
<b>logwages2017</b>	float	%9.0g		<b>Log wages</b>
<b>TFP2017</b>	float	%9.0g		<b>TFP</b>
<b>logemp2017</b>	float	%9.0g		<b>log employment in 2017</b>
<b>EXP2017</b>	float	%9.0g		<b>EXPORT INTENSITY in 2017</b>
<b>RD2017</b>	byte	%9.0g		<b>R&amp;D dummy in 2017</b>
<b>TFPS17</b>	float	%9.0g		
<b>emp2015</b>	float	%9.0g		
<b>wages15</b>	float	%9.0g		
<b>debts15</b>	float	%9.0g		

Sorted by: **FDI2016**

```

70.
71. //      Frequencies of FDI types
72. tab FDIYPE2016

```

FDI type	Freq.	Percent	Cum.
No FDI	<b>6,863</b>	<b>60.61</b>	<b>60.61</b>
Exports-oriented FDI	<b>940</b>	<b>8.30</b>	<b>68.91</b>
Technology intensive FDI	<b>1,555</b>	<b>13.73</b>	<b>82.65</b>
Domestic market seeking FDI	<b>1,965</b>	<b>17.35</b>	<b>100.00</b>
Total	<b>11,323</b>	<b>100.00</b>	

```

73.
74. *-----*
75. *      PART 1.1: Correlations matrix
76. *-----*
77.
78. corr      FDI2016 ///
>          OWN TECH PORT ///
>          logwages2015 TFP2015 emp2015 DEBTS2015 EXP2015 RD2015
(obs=11,323)

```

	FDI2016	OWN	TECH	PORT	logwag~5	TFP2015
FDI2016	<b>1.0000</b>					
OWN	<b>0.1026</b>	<b>1.0000</b>				
TECH	<b>-0.3144</b>	<b>-0.1797</b>	<b>1.0000</b>			
PORT	<b>0.1984</b>	<b>0.0564</b>	<b>-0.4172</b>	<b>1.0000</b>		
logwages2015	<b>-0.0633</b>	<b>-0.0566</b>	<b>0.1843</b>	<b>-0.0694</b>	<b>1.0000</b>	
TFP2015	<b>-0.0868</b>	<b>-0.0457</b>	<b>0.1080</b>	<b>0.0620</b>	<b>0.0351</b>	<b>1.0000</b>
emp2015	<b>0.0249</b>	<b>-0.0025</b>	<b>-0.0353</b>	<b>0.0319</b>	<b>-0.0062</b>	<b>-0.0035</b>
DEBTS2015	<b>-0.0259</b>	<b>0.2636</b>	<b>-0.0064</b>	<b>0.0019</b>	<b>-0.0327</b>	<b>-0.0423</b>
EXP2015	<b>0.4480</b>	<b>-0.1249</b>	<b>0.3125</b>	<b>0.2780</b>	<b>0.0453</b>	<b>0.0409</b>
RD2015	<b>0.0175</b>	<b>0.0070</b>	<b>0.0093</b>	<b>-0.0088</b>	<b>0.0100</b>	<b>0.0419</b>

	emp2015	DEB~2015	EXP2015	RD2015
emp2015	1.0000			
DEBTS2015	-0.0026	1.0000		
EXP2015	0.0220	0.0668	1.0000	
RD2015	-0.0088	-0.0044	-0.0009	1.0000

```

79.
80.
81. *****
82. * PART 2: Summary Statistics
83. *****
84.
85. // Continuous variables
86. outreg2 using "$results/02_Descriptive_Analysis/summarystats.tex", ///
> sum(detail) replace ///
> keep(wages15 TFP2015 debts15 EXP2015 emp2015) ///
> label eqkeep(mean p50 sd min max)

```

firm identifier				
	Percentiles	Smallest		
1%	124	1		
5%	623	2		
10%	1245	4	Obs	11,323
25%	3101	6	Sum of Wgt.	11,323
50%	6186		Mean	6181.449
		Largest	Std. Dev.	3558.895
75%	9252	12330		
90%	11111	12331	Variance	1.27e+07
95%	11735	12332	Skewness	-.0042869
99%	12212	12333	Kurtosis	1.80306

FDI/TREATMENT dummy in 2016				
	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	11,323
25%	0	0	Sum of Wgt.	11,323
50%	0		Mean	.3938885
		Largest	Std. Dev.	.4886322
75%	1	1		
90%	1	1	Variance	.2387614
95%	1	1	Skewness	.4343395
99%	1	1	Kurtosis	1.188651

FDI type				
	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	11,323
25%	0	0	Sum of Wgt.	11,323
50%	0		Mean	.8783008
		Largest	Std. Dev.	1.192862
75%	2	3		
90%	3	3	Variance	1.42292
95%	3	3	Skewness	.8489698
99%	3	3	Kurtosis	2.022788

Ownership				
	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	2	1	Obs	11,323
25%	2	1	Sum of Wgt.	11,323
50%	3		Mean	2.888987
		Largest	Std. Dev.	.9071667
75%	4	4		
90%	4	4	Variance	.8229515
95%	4	4	Skewness	-.4250337
99%	4	4	Kurtosis	2.357997

Technology intensity				
	Percentiles	Smallest		
1%	1	1		
5%	1	1		
10%	1	1	Obs	11,323
25%	1	1	Sum of Wgt.	11,323
50%	2		Mean	2.278636
		Largest	Std. Dev.	1.130658
75%	3	4		
90%	4	4	Variance	1.278387
95%	4	4	Skewness	.1369556
99%	4	4	Kurtosis	1.562267

Access to port				
	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	11,323
25%	0	0	Sum of Wgt.	11,323
50%	0		Mean	.3494657
		Largest	Std. Dev.	.4768223
75%	1	1		
90%	1	1	Variance	.2273595
95%	1	1	Skewness	.6314342
99%	1	1	Kurtosis	1.398709

Log wages				
	Percentiles	Smallest		
1%	-1.638978	-7.331795		
5%	1.059369	-7.103724		
10%	2.408368	-5.701573	Obs	11,323
25%	4.74146	-5.625238	Sum of Wgt.	11,323
50%	7.338148		Mean	7.332918
		Largest	Std. Dev.	3.838861
75%	9.902966	20.87844		
90%	12.20624	20.99824	Variance	14.73685
95%	13.65446	21.31597	Skewness	.0050248
99%	16.26827	22.43151	Kurtosis	3.044124

TFP				
	Percentiles	Smallest		
1%	-1.760341	-5.359266		
5%	-.3396301	-4.564884		
10%	.4065464	-3.947462	Obs	11,323
25%	1.69375	-3.887785	Sum of Wgt.	11,323



50%	<b>3.032239</b>		Mean	<b>3.041338</b>
		Largest	Std. Dev.	<b>2.046604</b>
75%	<b>4.417369</b>	<b>10.39066</b>		
90%	<b>5.679015</b>	<b>10.79894</b>	Variance	<b>4.188589</b>
95%	<b>6.381904</b>	<b>10.82878</b>	Skewness	<b>-.0117873</b>
99%	<b>7.791977</b>	<b>11.35702</b>	Kurtosis	<b>3.028324</b>

Log employment

	Percentiles	Smallest		
1%	<b>-2.634289</b>	<b>-6.228763</b>		
5%	<b>-.5589151</b>	<b>-6.20012</b>		
10%	<b>.5075461</b>	<b>-6.185894</b>	Obs	<b>11,323</b>
25%	<b>2.341855</b>	<b>-6.092359</b>	Sum of Wgt.	<b>11,323</b>
50%	<b>4.399255</b>		Mean	<b>4.411473</b>
		Largest	Std. Dev.	<b>3.040198</b>
75%	<b>6.524904</b>	<b>14.9902</b>		
90%	<b>8.279512</b>	<b>15.08997</b>	Variance	<b>9.242801</b>
95%	<b>9.413677</b>	<b>15.28719</b>	Skewness	<b>-.0080799</b>
99%	<b>11.393</b>	<b>15.99303</b>	Kurtosis	<b>2.960453</b>

Log debts

	Percentiles	Smallest		
1%	<b>-.1750222</b>	<b>-.1998464</b>		
5%	<b>-.0806167</b>	<b>-.1997392</b>		
10%	<b>.029059</b>	<b>-.199408</b>	Obs	<b>11,323</b>
25%	<b>.2368089</b>	<b>-.1993328</b>	Sum of Wgt.	<b>11,323</b>
50%	<b>.5004624</b>		Mean	<b>.5040355</b>
		Largest	Std. Dev.	<b>.3525262</b>
75%	<b>.7537385</b>	<b>1.2992</b>		
90%	<b>.9722362</b>	<b>1.29932</b>	Variance	<b>.1242747</b>
95%	<b>1.122765</b>	<b>1.299587</b>	Skewness	<b>.0806031</b>
99%	<b>1.254863</b>	<b>1.299778</b>	Kurtosis	<b>2.316729</b>

Export intensity

	Percentiles	Smallest		
1%	<b>.0190834</b>	<b>.0103205</b>		
5%	<b>.0384401</b>	<b>.0104334</b>		
10%	<b>.0575267</b>	<b>.0104726</b>	Obs	<b>11,323</b>
25%	<b>.0990072</b>	<b>.0105073</b>	Sum of Wgt.	<b>11,323</b>
50%	<b>.1543709</b>		Mean	<b>.1593435</b>
		Largest	Std. Dev.	<b>.0798147</b>
75%	<b>.2130122</b>	<b>.4667603</b>		
90%	<b>.2652063</b>	<b>.4720742</b>	Variance	<b>.0063704</b>
95%	<b>.2949337</b>	<b>.4777972</b>	Skewness	<b>.4171633</b>
99%	<b>.3648675</b>	<b>.4831533</b>	Kurtosis	<b>2.827241</b>

R&D dummy

	Percentiles	Smallest		
1%	<b>0</b>	<b>0</b>		
5%	<b>0</b>	<b>0</b>		
10%	<b>0</b>	<b>0</b>	Obs	<b>11,323</b>
25%	<b>0</b>	<b>0</b>	Sum of Wgt.	<b>11,323</b>
50%	<b>0</b>		Mean	<b>.1211693</b>
		Largest	Std. Dev.	<b>.3263383</b>
75%	<b>0</b>	<b>1</b>		
90%	<b>1</b>	<b>1</b>	Variance	<b>.1064967</b>
95%	<b>1</b>	<b>1</b>	Skewness	<b>2.321808</b>
99%	<b>1</b>	<b>1</b>	Kurtosis	<b>6.390791</b>

Log wages				
	Percentiles	Smallest		
1%	-2.120156	-6.185148		
5%	-.0123446	-6.022474		
10%	1.035314	-5.493109	Obs	11,323
25%	2.910137	-5.369166	Sum of Wgt.	11,323
50%	4.989117		Mean	5.010195
		Largest	Std. Dev.	3.082818
75%	7.136983	15.41822		
90%	8.938831	15.76589	Variance	9.503766
95%	10.04671	16.21945	Skewness	-.0073109
99%	12.01537	17.04211	Kurtosis	2.956235

TFP				
	Percentiles	Smallest		
1%	-1.170003	-4.700881		
5%	.2511905	-3.951226		
10%	1.018264	-3.692741	Obs	11,323
25%	2.283582	-3.331597	Sum of Wgt.	11,323
50%	3.664006		Mean	3.656046
		Largest	Std. Dev.	2.056464
75%	5.041636	11.30793		
90%	6.310671	11.34453	Variance	4.229043
95%	7.028272	11.62984	Skewness	-.016582
99%	8.400249	11.8114	Kurtosis	3.017121

log employment in 2017				
	Percentiles	Smallest		
1%	-2.170581	-6.217651		
5%	-.018102	-6.184767		
10%	1.038013	-5.748356	Obs	11,323
25%	2.929524	-5.622331	Sum of Wgt.	11,323
50%	5.0262		Mean	5.030484
		Largest	Std. Dev.	3.094736
75%	7.173199	15.48663		
90%	8.980158	15.49919	Variance	9.57739
95%	10.10212	15.74725	Skewness	-.024026
99%	12.07887	16.38825	Kurtosis	2.950697

EXPORT INTENSITY in 2017				
	Percentiles	Smallest		
1%	.0581937	.0187976		
5%	.1113043	.0211925		
10%	.1423226	.0216743	Obs	11,323
25%	.19367	.0221602	Sum of Wgt.	11,323
50%	.2606816		Mean	.2696827
		Largest	Std. Dev.	.1083555
75%	.3300854	.7790653		
90%	.4089049	.7935594	Variance	.0117409
95%	.4650209	.8165495	Skewness	.6997986
99%	.5815625	.9501169	Kurtosis	4.15865

R&D dummy in 2017				
	Percentiles	Smallest		
1%	0	0		
5%	0	0		
10%	0	0	Obs	11,323
25%	0	0	Sum of Wgt.	11,323

50%	0		Mean	.4074009
		Largest	Std. Dev.	.4913723
75%	1	1		
90%	1	1	Variance	.2414467
95%	1	1	Skewness	.3769168
99%	1	1	Kurtosis	1.142066

TFPS17

	Percentiles	Smallest		
1%	-2.34677	-4.063736		
5%	-1.655684	-3.6992		
10%	-1.282678	-3.573506	Obs	11,323
25%	-.66739	-3.397892	Sum of Wgt.	11,323
50%	.0038706		Mean	1.64e-07
		Largest	Std. Dev.	.9999998
75%	.6737731	3.720892		
90%	1.290869	3.738692	Variance	.9999996
95%	1.639817	3.87743	Skewness	-.016582
99%	2.306971	3.965719	Kurtosis	3.017121

emp2015

	Percentiles	Smallest		
1%	.07177	.0019719		
5%	.5718291	.0020292		
10%	1.66121	.0020583	Obs	11,323
25%	10.40051	.0022601	Sum of Wgt.	11,323
50%	81.39024		Mean	7111.033
		Largest	Std. Dev.	117154.6
75%	681.9145	3237150		
90%	3942.272	3576776	Variance	1.37e+10
95%	12254.85	4356531	Skewness	49.56077
99%	88698.71	8824411	Kurtosis	3179.901

wages15

	Percentiles	Smallest		
1%	.1941784	.0006544		
5%	2.884551	.000822		
10%	11.1158	.0033407	Obs	11,323
25%	114.6014	.0036057	Sum of Wgt.	11,323
50%	1537.861		Mean	1966556
		Largest	Std. Dev.	5.99e+07
75%	19989.56	1.17e+09		
90%	200032.7	1.32e+09	Variance	3.59e+15
95%	851244.9	1.81e+09	Skewness	73.88568
99%	1.16e+07	5.52e+09	Kurtosis	6472.332

debts15

	Percentiles	Smallest		
1%	.8394383	.8188565		
5%	.9225472	.8189443		
10%	1.029485	.8192155	Obs	11,323
25%	1.267199	.8192772	Sum of Wgt.	11,323
50%	1.649484		Mean	1.76176
		Largest	Std. Dev.	.6339302
75%	2.124929	3.666363		
90%	2.64385	3.666803	Variance	.4018675
95%	3.073339	3.667783	Skewness	.7983175
99%	3.507359	3.668482	Kurtosis	3.165366

C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2\_Appl\_Microeconometrics\fdimatchin  
 > g\_deleteEXP\04\_results\02\_Descriptive\_Analysis\summarystats.tex  
 dir : seeout

```
87.
88. //      Categorical variables
89.      tab PORT
```

Access to port	Freq.	Percent	Cum.
No ports within 500km	<b>7,366</b>	<b>65.05</b>	<b>65.05</b>
Ports within 500km	<b>3,957</b>	<b>34.95</b>	<b>100.00</b>
Total	<b>11,323</b>	<b>100.00</b>	

```
90.      tab OWN
```

Ownership	Freq.	Percent	Cum.
Listed companies	<b>909</b>	<b>8.03</b>	<b>8.03</b>
Subsidiaries	<b>2,630</b>	<b>23.23</b>	<b>31.25</b>
Independent	<b>4,593</b>	<b>40.56</b>	<b>71.82</b>
State	<b>3,191</b>	<b>28.18</b>	<b>100.00</b>
Total	<b>11,323</b>	<b>100.00</b>	

```
91.      tab TECH
```

Technology intensity	Freq.	Percent	Cum.
Low-tech industries	<b>4,194</b>	<b>37.04</b>	<b>37.04</b>
Medium low-tech industries	<b>1,685</b>	<b>14.88</b>	<b>51.92</b>
Medium high-tech industries	<b>3,539</b>	<b>31.25</b>	<b>83.18</b>
High-tech industries	<b>1,905</b>	<b>16.82</b>	<b>100.00</b>
Total	<b>11,323</b>	<b>100.00</b>	

```
92.      tab RD2015
```

R&D dummy	Freq.	Percent	Cum.
0	<b>9,951</b>	<b>87.88</b>	<b>87.88</b>
1	<b>1,372</b>	<b>12.12</b>	<b>100.00</b>
Total	<b>11,323</b>	<b>100.00</b>	

```
93.
94. *-----*
95. *      PART 2.1: Checking for Outliers in employment variable
96. *-----*
97.
98.      set scheme plotplainblind
99.
100.     scatter TFP2017 emp2015, ytitle("TFP in 2017")
101
102.     graph save $results/02_Descriptive_Analysis/emp2015_outliers.gph, ///
>     replace
(file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdim
> atching_deleteEXP\04_results\02_Descriptive_Analysis\emp2015_outliers.gph saved)
101
102.     graph export $results/02_Descriptive_Analysis/emp2015_outliers.png, ///
>     as(png) replace
(file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdim
> atching_deleteEXP\04_results\02_Descriptive_Analysis\emp2015_outliers.png written in
> PNG format)
```

```

103
104
105 *****
106 *                               PART 3: Balance Tables
107 *****
108
109 //                               By treatment variable
110 iealtab      TECH PORT ///
111 >             logwages2015 TFP2015 logemp2015 DEBTS2015 EXP2015 RD2015, //
112 > /
113 >             grpvar(FDI2016) ///
114 >             savetex("$results/02_Descriptive_Analysis/baltest_byfdi_pre.
115 > tex") ///
116 >             rowvarlabels texdoc replace
117
118 Balance table saved to:
119 C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\
120 > fdimatching_deleteEXP\04_results\02_Descriptive_Analysis\baltest_byfdi_pre
121 > .tex
122
123
124 //                               By FDI type (treatment arms) [not reported in paper]
125 iealtab      TECH PORT ///
126 >             logwages2015 TFP2015 logemp2015 DEBTS2015 EXP2015 RD2015, //
127 > /
128 >             grpvar(FDITYPE2016) ///
129 >             savetex("$results/02_Descriptive_Analysis/baltest_fditype_pr
130 > e.tex") ///
131 >             rowvarlabels texdoc replace
132
133 Balance table saved to:
134 C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\
135 > fdimatching_deleteEXP\04_results\02_Descriptive_Analysis\baltest_fditype_p
136 > re.tex
137
138
139 end of do-file
140
141
142 *****
143 *                               PART 3: Results
144 *****
145
146 -----*
147 *       PART 3.1: Effect of FDI on TFP
148 -----*
149
150 do $scripts/03a_Main_Results
151
152 /*****
153 >                               MAIN RESULTS DO-FILE
154 > *****/
155 >
156 >                               Applied Microeconometrics
157 >
158 >                               Empirical Project
159 >
160 >                               Do-File 03a
161 >
162 >                               PURPOSE:      Estimation of the effect of FDI on TFP.
163 >
164 >                               OUTLINE:      PART 1: Several ATE estimations for      main model
165 >                                               PART 1.1: NN1
166 >                                               Part 1.2: NN5 with caliper 0.05
167 >                                               Part 1.3: IPW
168 >                                               Part 1.4: AIPW
169 >
170 > *****/
171 >                               PART 1: Several ATE estimations for      main model
172 > *****/

```

```

128
129 *-----*
130 *      PART 1.1: NN1
131 *-----*
132
133      //ATE
134      cap drop osal
135
136      cap drop pl*
137
138      cap teffects psmatch (TFPS17) ///
139      > (FDI2016 i.($F) c.($C), logit), ///
140      > osample(osal) generate(pl)
141
142      outreg2 using $results/05_Tables/Table2_TFP.tex, replace dec(3) ///
143      > drop(i.OWN i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 i.TECH RD2015) ///
144      > nocon eqdrop(TME1)
145      C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
146      > g_deleteEXP\04_results\05_Tables\Table2_TFP.tex
147      dir : seeout

```

```

139
140      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	11,323	22,646
Treated obs =	4,460	11,323
Control obs =	6,863	11,323

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.018354	-.0175033	.9769702	.9774223
Independent	.0616272	-.0068445	1.02321	.9972679
State	.1016402	.0130378	1.100951	1.01213
TECH				
Medium low-~s	.1206088	-.0400593	1.263082	.9244732
Medium high-~s	-.2329159	.0104791	.8156583	1.008514
High-tech in~s	-.5425507	.0051861	.2855456	1.009211
RD2015				
1	.0356507	.016501	1.085768	1.039031
logwages2015	-.1300321	.0174603	.9769191	1.009556
TFP2015	-.178877	-.013165	.9473458	.9917016
emp2015	.0470091	.0271819	5.49725	1.696765
DEBTS2015	-.0529435	-.0040148	1.051101	1.017773

```

141
142 *-----*
143 *      PART 1.2: NN5 with caliper 0.05
144 *-----*
145 >

```

```

145          // ATE
146      cap drop osal
147      cap drop pl*
148      cap teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit), ///
>                                     nneighbor(5) caliper(.05) osample(os
> al) generate(pl)
149                                     // 5 observations violate caliper
150
151      // Reestimate
152      cap teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit) if o
> sal==0, ///
>                                     nneighbor(5) caliper(.05) generate
> (pl)
153
154      outreg2 using $results/05_Tables/Table2_TFP.tex, append dec(3) ///
>      drop(i.OWN i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 i.TECH RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table2_TFP.tex
dir : seeout
155
156      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	11,318	22,636
Treated obs =	4,456	11,318
Control obs =	6,862	11,318

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.0190182	-.0205252	.976131	.9738583
Independent	.0618259	-.0100251	1.023258	.9959379
State	.1020001	.0045727	1.101344	1.004328
TECH				
Medium low-tech	.1209652	-.0328628	1.263818	.9372059
Medium high-tech	-.2325048	.0081591	.816095	1.006628
High-tech in-tech	-.5424366	.0045745	.2857586	1.008117
RD2015				
1	.0359419	.0166292	1.086462	1.03894
logwages2015	-.1300519	.0082815	.977301	1.00904
TFP2015	-.1787364	-.0294567	.9475049	.9850587
emp2015	.0436824	.0385463	.5304931	.4724067
DEBTS2015	-.0525752	-.0086042	1.051687	1.01474

```

157
158 *-----*
159 *      PART 1.3: IPW
160 *-----*
161      // ATE
162      cap drop osal

163
164      teffects ipw (TFPS17) (FDI2016 i.($F) c.($C), logit),      osample(osal)

Iteration 0:      EE criterion = 4.223e-23
Iteration 1:      EE criterion = 1.805e-33

Treatment-effects estimation      Number of obs      =      11,323
Estimator      : inverse-probability weights
Outcome model  : weighted mean
Treatment model: logit

```

TFPS17	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.1221664	.0068002	17.97	0.000	.1088383	.1354945
<b>POMean</b>						
FDI2016 0	-.0682823	.0096669	-7.06	0.000	-.0872292	-.0493354

```

165      outreg2 using $results/05_Tables/Table2_TFP.tex, append dec(3) ///
>      drop(i.OWN i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 i.TECH RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table2_TFP.tex
dir : seeout

```

```

166
167      tebalance summarize

```

Covariate balance summary

	Raw	Weighted
Number of obs =	11,323	11,323.0
Treated obs =	4,460	5,630.2
Control obs =	6,863	5,692.8

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
OWN				
Subsidiaries	-.018354	-.0075057	.9769702	.990309
Independent	.0616272	-.0006473	1.02321	.9997498
State	.1016402	.0120719	1.100951	1.011322
TECH				
Medium low-~s	.1206088	.0037312	1.263082	1.007386
Medium high-~s	-.2329159	-.0001227	.8156583	.9999017
High-tech in~s	-.5425507	-.0102215	.2855456	.9817943
RD2015				
1	.0356507	.0088614	1.085768	1.020464
logwages2015	-.1300321	-.0016836	.9769191	1.003246
TFP2015	-.178877	-.0199601	.9473458	.9420373
emp2015	.0470091	.0126666	5.49725	1.243208
DEBTS2015	-.0529435	-.0129979	1.051101	1.016256



```

168
169 *-----*
170 *      PART 1.4: AIWP
171 *-----*
>
172      // ATE
173      cap drop osal

174
175      teffects aipw (TFP2017 ($F) ($C) ) (FDI2016 i.($F) c.($C) )

Iteration 0:   EE criterion = 4.223e-23
Iteration 1:   EE criterion = 3.941e-32

Treatment-effects estimation                      Number of obs      =    11,323
Estimator      : augmented IPW
Outcome model  : linear by ML
Treatment model: logit

```

TFP2017	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.2918229	.0061911	47.14	0.000	.2796885	.3039572
<b>POMean</b>						
FDI2016 0	3.539684	.0195128	181.40	0.000	3.501439	3.577928

```

176
177      outreg2 using $results/05_Tables/Table2_TFP.tex, append dec(3) ///
>      drop(i.OWN i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 i.TECH RD2015) ///
>      nocon eqdrop(OME0 OME1 TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP/04_results/05_Tables/Table2_TFP.tex
dir : seeout

```

```

178
179      tebalance summarize

```

Covariate balance summary

	Raw	Weighted
Number of obs =	11,323	11,323.0
Treated obs =	4,460	5,630.2
Control obs =	6,863	5,692.8

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
OWN				
Subsidiaries	-.018354	-.0075057	.9769702	.990309
Independent	.0616272	-.0006473	1.02321	.9997498
State	.1016402	.0120719	1.100951	1.011322
TECH				
Medium low-t~s	.1206088	.0037312	1.263082	1.007386
Medium high--s	-.2329159	-.0001227	.8156583	.9999017
High-tech in~s	-.5425507	-.0102215	.2855456	.9817943
RD2015				
1	.0356507	.0088614	1.085768	1.020464
logwages2015	-.1300321	-.0016836	.9769191	1.003246
TFP2015	-.178877	-.0199601	.9473458	.9420373
emp2015	.0470091	.0126666	5.49725	1.243208
DEBTS2015	-.0529435	-.0129979	1.051101	1.016256

```

180
181
182     end of do-file

183
184 *-----*
185 *      PART 3.2: Robustness Checks
186 *-----*
187
188         do $scripts/03b_Robustness_Checks

189 /*****
190 >                                     ROBUSTNESS DO-FILE
191 > *****/
192 >
193 >         Applied Microeconometrics
194 >
195 >         Empirical Project
196 >
197 >         Do-File 03b
198 >
199 >         PURPOSE:      Robustness Checks.
200 >
201 >         OUTLINE:      PART 1: Including Interactions
202 >                       PART 2: Excluding Outliers
203 >                       PART 3: Including PORT
204 >                       PART 4: ATT
205 >                       PART 5: Analysis by TECH
206 >                       PART 6: Appendix: Frequency of FDI by TECH
207 > *****/
208 >         PART 1: Including Interactions
209 > *****/
210
211     cap drop osal
212
213     cap drop pl*
214
215     teffects psmatch (TFPS17) /// (FDI2016 i.($F)##c.($C), logit), ///
216                                     osample(osal) generate(pl)
217
218     Treatment-effects estimation      Number of obs      =      11,323
219     Estimator      : propensity-score matching      Matches: requested =      1
220     Outcome model  : matching                      min =      1
221     Treatment model: logit                        max =      1
222
223     +-----+-----+-----+-----+-----+-----+
224     | TFPS17 | Coef. | AI Robust | z | P>|z| | [95% Conf. Interval] |
225     +-----+-----+-----+-----+-----+-----+
226     | ATE    |       |           |   |     |                   |
227     | FDI2016 |       |           |   |     |                   |
228     | (1 vs 0) | .1520598 | .0157615 | 9.65 | 0.000 | .1211679 | .1829518 |
229     +-----+-----+-----+-----+-----+-----+
230
231     tebalance summarize
232
233     Covariate balance summary
234
235     +-----+-----+-----+
236     | Raw | Matched |
237     +-----+-----+-----+
238     | Number of obs = | 11,323 | 22,646 |
239     | Treated obs =   | 4,460  | 11,323 |
240     | Control obs =   | 6,863  | 11,323 |
241     +-----+-----+-----+

```

	Standardized Raw	differences Matched	Variance ratio Raw	Matched
OWN				
Subsidiaries	-.018354	-.0301379	.9769702	.9615233
Independent	.0616272	-.0196548	1.02321	.9919582
State	.1016402	.0280783	1.100951	1.026604
TECH				
Medium low-t~s	.1206088	-.016179	1.263082	.9683774
Medium high--s	-.2329159	-.0260248	.8156583	.9785426
High-tech in~s	-.5425507	.0375841	.2855456	1.067129
RD2015				
1	.0356507	.0341887	1.085768	1.080693
logwages2015	-.1300321	.0235087	.9769191	1.036729
TFP2015	-.178877	.0069241	.9473458	.980012
emp2015	.0470091	.0220187	5.49725	3.424582
DEBTS2015	-.0529435	.0128246	1.051101	.9874191
OWN#				
logwages2015				
Subsidiaries	-.0501523	-.0264313	.8787442	.957907
Independent	.0095374	-.0051365	.9615021	1.062062
State	.0578536	.0245939	1.020548	1.011841
OWN#				
TFP2015				
Subsidiaries	-.064156	-.0361761	.8276227	.9193172
Independent	-.0408866	-.0118797	.8831729	1.000839
State	.0558077	.0348481	1.040186	1.056287
OWN#				
emp2015				
Subsidiaries	.0333955	.0270158	17.59077	16.69265
Independent	.0268385	-.0058267	3.91432	.9369739
State	.0189749	.00586	.5735634	.6417643
OWN#				
DEBTS2015				
Subsidiaries	-.0444712	-.0346152	.8861299	.9220981
Independent	-.0148901	-.0132875	.9654587	.9511524
State	.0840856	.0313432	1.078225	1.038717
TECH#				
logwages2015				
Medium low-t~s	.0985765	-.0130018	1.221177	.95976
Medium high--s	-.1947846	-.0207019	.7998561	.9750318
High-tech in~s	-.4878963	.0551011	.2637228	1.200365
TECH#				
TFP2015				
Medium low-t~s	.0592069	-.0168126	1.09476	.9223716
Medium high--s	-.2626395	-.030936	.6142341	.9223356
High-tech in~s	-.4825334	.0340785	.2214855	1.141804
TECH#				
emp2015				
Medium low-t~s	.0099385	-.0232465	.1033668	.0229633
Medium high--s	.0215945	.0060306	.4923478	.1691328
High-tech in~s	.023925	.0399947	2.37245	1.036049
TECH#				
DEBTS2015				
Medium low-t~s	.0875624	-.0089829	1.216558	.9383764
Medium high--s	-.1987245	-.0020756	.7404538	1.01959
High-tech in~s	-.4597713	.0262805	.2304414	1.072064
RD2015#				
logwages2015				

1	.0055913	.0333829	.9912599	1.099438
RD2015#				
TFP2015				
1	.0080044	.0475566	.9791256	1.254495
RD2015#				
emp2015				
1	.0639848	.0382383	31.03198	8.471608
RD2015#				
DEBTS2015				
1	.0328123	.0266122	1.167688	1.085422

```

196
197      outreg2 using $results/05_Tables/Table6_Robustness.tex, replace dec(3) ///
>      drop(i.OWN i.TECH logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconomics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table6_Robustness.tex
dir : seeout

```

```

198
199 *****
200 *          PART 2: Excluding Outliers
201 *****
202
203      cap drop osal
204
205      cap drop pl*
206
207      cap teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit) if e
> mp2015<4000000,                    ///
>                                     osample(osal) generate(pl)
206
207      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	11,321	22,642
Treated obs =	4,458	11,321
Control obs =	6,863	11,321

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.0186455	-.0214674	.9766001	.9725788
Independent	.0615581	-.0041437	1.023189	.9983425
State	.1019412	.0054729	1.101223	1.005197
TECH				
Medium low-t~s	.1208152	-.0380474	1.263528	.9282785
Medium high~s	-.2326559	.0078187	.8159034	1.006379
High-tech in~s	-.5424529	.0047152	.2856663	1.00837
RD2015				
1	.0358227	.0032695	1.086184	1.007708
logwages2015	-.1301697	.0098616	.9772428	.9891245
TFP2015	-.1790158	-.01456	.9477123	.9622371
emp2015	.0415358	.0517651	1.120857	1.126963
DEBTS2015	-.0528498	-.0106762	1.051515	.9991066

```

208
209      outreg2 using $results/05_Tables/Table6_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP/04_results/05_Tables/Table6_Robustness.tex
dir : seeout

```

```

210
211 *****
212 *          PART 3: Including PORT
213 *****
214
215 global P "OWN TECH RD2015 PORT"

```

```

216
217      cap drop osal
218
219      cap drop pl*
219      cap teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($P) c.($C), logit),      ///
>                                     osample(osal) generate(pl)

```

```

220
221      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	<b>11,323</b>	<b>22,646</b>
Treated obs =	<b>4,460</b>	<b>11,323</b>
Control obs =	<b>6,863</b>	<b>11,323</b>

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.018354	-.0200286	.9769702	.97423
Independent	.0616272	.0032353	1.02321	1.001221
State	.1016402	-.0052983	1.100951	.9948827
TECH				
Medium low-t~s	.1206088	-.0586116	1.263082	.8913964
Medium high-~s	-.2329159	-.002487	.8156583	.9979324
High-tech in~s	-.5425507	.0329806	.2855456	1.058948
RD2015				
1	.0356507	.0246992	1.085768	1.058193
PORT				
Ports within-m	.4092869	.0661913	1.253595	1.041592
logwages2015	-.1300321	.0176969	.9769191	1.037866
TFP2015	-.178877	-.0131356	.9473458	.9480748
emp2015	.0470091	.0419073	5.49725	3.052481
DEBTS2015	-.0529435	-.019821	1.051101	1.007143

```

222
223      outreg2 using $results/05_Tables/Table6_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP/04_results/05_Tables/Table6_Robustness.tex
dir : seeout

```

```

224
225 *****
226 *                PART 4: ATT
227 *****
228
229      cap drop osal
230
231      cap drop p1*
232
231      cap teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit), atet
>      ///
>                                     osample(osal) generate(p1)
232
233      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	11,323	8,920
Treated obs =	4,460	4,460
Control obs =	6,863	4,460

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.018354	.010732	.9769702	1.014212
Independent	.0616272	.0099883	1.02321	1.00318
State	.1016402	-.0294066	1.100951	.9770547
TECH				
Medium low-t~s	.1206088	-.0553476	1.263082	.9143962
Medium high~s	-.2329159	.0145945	.8156583	1.017453
High-tech in~s	-.5425507	.0039358	.2855456	1.015497
RD2015				
1	.0356507	.0196597	1.085768	1.045608
logwages2015	-.1300321	.0080137	.9769191	.9922576
TFP2015	-.178877	-.0156447	.9473458	1.002034
emp2015	.0470091	.0210317	5.49725	2.356114
DEBTS2015	-.0529435	-.0152205	1.051101	1.029529

```

234
235      outreg2 using $results/05_Tables/Table6_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP/04_results/05_Tables/Table6_Robustness.tex
dir : seeout

```

```

236
237 *****
238 * PART 5: Analysis by TECH
239 *****
240
241 *=====
242 * (1) NN1 TECH=1
243 *=====
244
245 cap drop osal
246
247 cap drop pl
248
249 teffects psmatch (TFPS17) ///
> (FDI2016 i.($F) c.($C), logit) if TECH==1,
> ///
> osample(osal) generate(pl)
note: 1.TECH omitted because of collinearity

```

```

Treatment-effects estimation      Number of obs      =      4,194
Estimator      : propensity-score matching      Matches: requested =      1
Outcome model  : matching                      min =      1
Treatment model: logit                      max =      1

```

	TFPS17	Coef.	AI Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>							
	FDI2016 (1 vs 0)	.1600066	.0195613	8.18	0.000	.1216672	.1983461

```

248
249 tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	4,194	8,388
Treated obs =	2,325	4,194
Control obs =	1,869	4,194

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	.0299781	.0150625	1.036398	1.018467
Independent	.0057604	-.0071951	1.001373	.9984236
State	-.0250578	-.0015653	.9786308	.9986098
RD2015				
1	.0165825	-.0014964	1.041031	.9963872
logwages2015	-.0219915	.0051526	1.012966	1.058301
TFP2015	.0072539	.0099917	.9676072	1.008227
emp2015	.0253438	-.0031803	4.356693	1.864609
DEBTS2015	-.0474876	.0088166	1.031416	.9736994

```

250
251      outreg2 using $results/05_Tables/Table7_Robustness.tex, replace dec(3) ///
>      drop(i.OWN i.TECH i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table7_Robustness.tex
dir : seeout

```

```

252
253 *****
254 * (2) NN1 TECH=2
255 *****
256
257      cap drop osal
258      cap drop pl
259      teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit) if TECH==2,
>      ///
>                                     osample(osal) generate(pl)
note: 2.TECH omitted because of collinearity

```

```

Treatment-effects estimation      Number of obs      =      1,685
Estimator      : propensity-score matching      Matches: requested =      1
Outcome model  : matching                      min =      1
Treatment model: logit                      max =      1

```

TFPS17	Coef.	AI Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.0864057	.02799	3.09	0.002	.0315463	.1412652

```

260
261      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	1,685	3,370
Treated obs =	781	1,685
Control obs =	904	1,685

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.0789459	-.0222737	.9057037	.9730349
Independent	.0356487	.0449057	1.015483	1.019382
State	.094977	-.0685426	1.082362	.9424559
RD2015				
1	.0196745	.010822	1.04555	1.025096
logwages2015	-.0321255	.0186688	.9187912	.9609082
TFP2015	-.1550946	-.0443829	.9364425	.971122
emp2015	.0032877	.0284799	.0754936	.1191435
DEBTS2015	-.0426368	-.0683897	.9498591	.9548114



```

262
263      outreg2 using $results/05_Tables/Table7_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table7_Robustness.tex
dir : seeout

```

```

264
265 *****
266 * (3) NN1 TECH=3
267 *****
268
269      cap drop osal

270      cap drop pl

271      teffects psmatch (TFPS17) ///
>                               (FDI2016 i.($F) c.($C), logit) if TECH==3,
>      ///
>                               osample(osal) generate(pl)
note: 3.TECH omitted because of collinearity

```

```

Treatment-effects estimation      Number of obs      =      3,539
Estimator      : propensity-score matching      Matches: requested =      1
Outcome model  : matching                      min =      1
Treatment model: logit                      max =      1

```

TFPS17	Coef.	AI Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.1721028	.018644	9.23	0.000	.1355612	.2086444

```

272
273      tebalance summarize

```

Covariate balance summary

	Raw	Matched
Number of obs =	3,539	7,078
Treated obs =	1,107	3,539
Control obs =	2,432	3,539

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.1276748	.0379035	.8473309	1.04502
Independent	.0120872	-.0217603	1.004115	.9928833
State	.1432813	-.0069098	1.136897	.9933102
RD2015				
1	.0824806	.0169456	1.193028	1.038603
logwages2015	.0255104	-.0187561	.9997901	1.053611
TFP2015	-.2410387	.0237954	.9260925	.983687
emp2015	.074703	.0528976	.6929332	.4838172
DEBTS2015	-.0640427	-.0229667	1.051649	1.008139

```

274
275      outreg2 using $results/05_Tables/Table7_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table7_Robustness.tex
dir : seeout

```

```

276
277 *****
278 * (4) NN1 TECH=4
279 *****
280
281      cap drop osal
282      cap drop pl
283      teffects psmatch (TFPS17) ///
>                                     (FDI2016 i.($F) c.($C), logit) if TECH==4,
>      ///
>                                     osample(osal) generate(pl)
note: 4.TECH omitted because of collinearity

```

```

Treatment-effects estimation      Number of obs      =      1,905
Estimator      : propensity-score matching      Matches: requested =      1
Outcome model  : matching                      min =      1
Treatment model: logit                      max =      1

```

	TFPS17	Coef.	AI Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>							
	FDI2016 (1 vs 0)	.1802721	.0541962	3.33	0.001	.0740494	.2864947

```

284      tebalance summarize
>

```

Covariate balance summary

	Raw	Matched
Number of obs =	1,905	3,810
Treated obs =	247	1,905
Control obs =	1,658	1,905

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
OWN				
Subsidiaries	-.0779614	.0826873	.8814802	1.126006
Independent	.0522384	-.047133	1.044866	.9587982
State	.1691889	-.0427479	1.241433	.9400229
RD2015				
1	.0789006	.0224257	1.201598	1.053092
logwages2015	-.0580162	.1881349	1.050215	1.12134
TFP2015	-.2259366	.0580305	1.027535	1.144253
emp2015	.2584443	.152738	9.989972	1.226081
DEBTS2015	-.1862477	.0230111	1.1001	1.019314

```

285
286      outreg2 using $results/05_Tables/Table7_Robustness.tex, append dec(3) ///
>      drop(i.OWN i.TECH i.PORT logwages2015 TFP2015 emp2015 DEBTS2015 RD2015) ///
>      nocon eqdrop(TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\05_Tables\Table7_Robustness.tex
dir : seeout

287
288      // Calculating ATE weighted by each sample size:
289      display ///
>      (0.1600066*4194+0.0864057*1685+0.1721028*3539+0.1802721*1905)/11232
.15750992

290      /*= 0.15750992*/
291
292
293 *****
294 *          PART 6: Appendix: Frequency of FDI by TECH
295 *****
296
297      tab2 TECH FDI2016, row

```

-> tabulation of TECH by FDI2016

Key
frequency
row percentage

Technology intensity	FDI/TREATMENT dummy in 2016		Total
	0	1	
Low-tech industries	1,869 44.56	2,325 55.44	4,194 100.00
Medium low-tech indus	904 53.65	781 46.35	1,685 100.00
Medium high-tech indu	2,432 68.72	1,107 31.28	3,539 100.00
High-tech industries	1,658 87.03	247 12.97	1,905 100.00
Total	6,863 60.61	4,460 39.39	11,323 100.00

```

298
299      tabout TECH FDI2016 using $results/05_Tables/Table7a_Robustness.tex, ///
>      cells(freq row cum) format(0 1) style(tex) clab(No. Col_ % Cum_%) replace

Table output written to: C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Mic
> roeconometrics\fdimatching_deleteEXP\04_results\05_Tables\Table7a_Robustness.tex

& \multicolumn{9}{c}{FDI/TREATMENT dummy in 2016} \\
Technology intensity & \multicolumn{3}{c}{0} & \multicolumn{3}{c}{1} & \multicolumn{3}{c}{} \\
> {c}{Total} \\
&No.&Col & \%&Cum & \%&No.&Col & \%&Cum & \%&No.&Col & \%&Cum & \% \\
\hline
Low-tech industries&1869&44.6&27.2&2325&55.4&52.1&4194&100.0&37.0 \\
Medium low-tech industries&904&53.6&40.4&781&46.4&69.6&1685&100.0&51.9 \\
Medium high-tech industries&2432&68.7&75.8&1107&31.3&94.5&3539&100.0&83.2 \\
High-tech industries&1658&87.0&100.0&247&13.0&100.0&1905&100.0&100.0 \\
Total&6863&60.6&44&60&39.4&11323&100.0& \\

```

```

300 end of do-file

301
302 *-----*
303 *      PART 3.3: Analysis by Type of FDI
304 *-----*
305
306 do $scripts/03c_by_FDITYPE

307 /*****
>
>      BY FDI TYPE DO-FILE
> *****/
>
>      Applied Microeconometrics
>
>      Empirical Project
>
>      Do-File 03c
>
>      PURPOSE:      Estimation of the effect of different types of FDI o
> n TFP.
>
>      OUTLINE:      PART 1: Multinomial Logit Models
>                    1.1: AIPW
>                    1.2: IPW
>                    PART 2: Seperate Models
>                    2.1 AIPW
> *****/
>
>      PART 1: Multinomial Logit Models
> *****/
308
309 *-----*
310 *      PART 1.1:      AIPW
311 *-----*
312
313 teffects aipw (TFPS17 i.($F) c.($C) ) (FDITYPE2016 i.($F) c.($C) )

Iteration 0:  EE criterion = 5.541e-20
Iteration 1:  EE criterion = 2.373e-33

Treatment-effects estimation      Number of obs      =      11,323
Estimator      : augmented IPW
Outcome model   : linear by ML
Treatment model: (multinomial) logit

```

TFPS17	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDITYPE2016 (Exports-.. vs No FDI)	.1435197	.0058746	24.43	0.000	.1320058	.1550337
(Technolo.. vs No FDI)	.1394529	.0045442	30.69	0.000	.1305465	.1483593
(Domesti.. vs No FDI)	.1432132	.0040598	35.28	0.000	.1352561	.1511702
<b>POMean</b>						
FDITYPE2016 No FDI	-.0565761	.0094884	-5.96	0.000	-.0751731	-.0379792

314  
315       tebalance summarize

Covariate balance summary

	Treatment		Observations	
	Raw	Weighted	Raw	Weighted
No FDI =	6,863	2,845.1		
Exports-ori~I =	940	2,863.3		
Technology ~I =	1,555	2,800.4		
Domestic ma~I =	1,965	2,814.2		
Total =	11,323	11,323.0		

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
<b>Exports-orient~I</b>				
OWN				
Subsidiaries	.029319	-.0159056	1.037004	.9793819
Independent	.0711904	-.0519146	1.026993	.977249
State	.0619914	.0177173	1.064555	1.016531
TECH				
Medium low-t~s	.0789971	-.0130459	1.173675	.974177
Medium high--s	-.2663044	-.0193414	.7842619	.9838819
High-tech in~s	-.5946766	.0430247	.222571	1.076075
RD2015				
1	-.1977282	.0562092	.5536423	1.130642
logwages2015	-.1833482	-.0587338	.9447749	.9103155
TFP2015	-.2141912	.0133092	.9704629	1.001579
emp2015	.0249499	.0555541	.3077821	.5456246
DEBTS2015	-.0665162	.0400558	1.024821	.9617875
<b>Technology in~I</b>				
OWN				
Subsidiaries	-.0227822	.0149411	.9717411	1.019102
Independent	.0312067	-.0110143	1.013148	.9956038
State	.1341894	.0156322	1.12989	1.01462
TECH				
Medium low-t~s	.1501373	.0016789	1.327181	1.003328
Medium high--s	-.2403611	-.0011011	.8089302	.9991046
High-tech in~s	-.5607553	-.0181223	.2633246	.9676973
RD2015				
1	-.0894951	-.0019277	.7908312	.9955541
logwages2015	-.1365085	-.0151862	.9818968	1.023026
TFP2015	-.2091214	-.0276276	.9481316	.9447849
emp2015	.0498435	.0196187	10.65892	1.505357
DEBTS2015	-.0186904	-.0394986	1.105096	1.080391
<b>Domestic mark~I</b>				
OWN				
Subsidiaries	-.0381328	-.0094519	.9519123	.9877872
Independent	.0810348	.0179192	1.02923	1.006665
State	.0945175	.0001241	1.094776	1.000121
TECH				
Medium low-t~s	.1164522	.001678	1.254467	1.003325
Medium high--s	-.211331	.0001045	.8359902	1.000089
High-tech in~s	-.5049792	-.011019	.3324869	.9803731
RD2015				
1	.2082867	.0056421	1.503124	1.013047
logwages2015	-.0997247	.0102345	.9871457	1.013854
TFP2015	-.1378965	-.0090628	.9336303	.938248

emp2015	.0558724	.0075184	3.896824	.902008
DEBTS2015	-.0741218	-.0206654	1.020553	.979131

```

316
317      teffects overlap, ptlevel(1) ///
>      saving($results\04_bytype\bytype_overlap_l1.gph, replace)
(file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdim
> atching_deleteEXP\04_results\04_bytype\bytype_overlap_l1.gph saved)

318
319      teffects overlap, ptlevel(2) ///
>      saving($results\04_bytype\bytype_overlap_l2.gph, replace)
(file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdim
> atching_deleteEXP\04_results\04_bytype\bytype_overlap_l2.gph saved)

320
321      teffects overlap, ptlevel(3) ///
>      saving($results\04_bytype\bytype_overlap_l3.gph, replace)
(file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdim
> atching_deleteEXP\04_results\04_bytype\bytype_overlap_l3.gph saved)

322
323      outreg2 using $results\04_bytype\bytype_table_1.tex, replace dec(3) ///
>      drop(OWN TECH RD2015 logwages2015 TFP2015 emp2015 DEBTS2015) ///
>      nocon eqdrop(OME0 OME1 OME2 OME3 TME1 TME2 TME3) lab()
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\04_bytype\bytype_table_1.tex
dir : seeout

324
325
326 *-----*
327 *      PART 1.2:      IPW
328 *-----*
329
330      teffects ipw (TFPS17 ) (FDITYPE2016 i.($F) c.($C))

```

```

Iteration 0:  EE criterion = 5.541e-20
Iteration 1:  EE criterion = 4.471e-33

```

```

Treatment-effects estimation      Number of obs      =      11,323
Estimator      : inverse-probability weights
Outcome model  : weighted mean
Treatment model: (multinomial) logit

```

TFPS17	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDITYPE2016						
(Exports-..						
vs						
No FDI)	.1570882	.0316177	4.97	0.000	.0951187	.2190577
(Technolo..						
vs						
No FDI)	.1123436	.0177869	6.32	0.000	.077482	.1472052
( Domesti..						
vs						
No FDI)	.1342705	.0106457	12.61	0.000	.1134052	.1551357
<b>POMean</b>						
FDITYPE2016						
No FDI	-.0684059	.0096686	-7.08	0.000	-.0873559	-.0494558

331  
332           tebalance summarize

Covariate balance summary

	Treatment		Observations	
	Raw	Weighted	Raw	Weighted
No FDI =	6,863	2,845.1		
Exports-ori~I =	940	2,863.3		
Technology ~I =	1,555	2,800.4		
Domestic ma~I =	1,965	2,814.2		
Total =	11,323	11,323.0		

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
<b>Exports-orient~I</b>				
OWN				
Subsidiaries	.029319	-.0159056	1.037004	.9793819
Independent	.0711904	-.0519146	1.026993	.977249
State	.0619914	.0177173	1.064555	1.016531
TECH				
Medium low-t~s	.0789971	-.0130459	1.173675	.974177
Medium high--s	-.2663044	-.0193414	.7842619	.9838819
High-tech in~s	-.5946766	.0430247	.222571	1.076075
RD2015				
1	-.1977282	.0562092	.5536423	1.130642
logwages2015	-.1833482	-.0587338	.9447749	.9103155
TFP2015	-.2141912	.0133092	.9704629	1.001579
emp2015	.0249499	.0555541	.3077821	.5456246
DEBTS2015	-.0665162	.0400558	1.024821	.9617875
<b>Technology in~I</b>				
OWN				
Subsidiaries	-.0227822	.0149411	.9717411	1.019102
Independent	.0312067	-.0110143	1.013148	.9956038
State	.1341894	.0156322	1.12989	1.01462
TECH				
Medium low-t~s	.1501373	.0016789	1.327181	1.003328
Medium high--s	-.2403611	-.0011011	.8089302	.9991046
High-tech in~s	-.5607553	-.0181223	.2633246	.9676973
RD2015				
1	-.0894951	-.0019277	.7908312	.9955541
logwages2015	-.1365085	-.0151862	.9818968	1.023026
TFP2015	-.2091214	-.0276276	.9481316	.9447849
emp2015	.0498435	.0196187	10.65892	1.505357
DEBTS2015	-.0186904	-.0394986	1.105096	1.080391
<b>Domestic mark~I</b>				
OWN				
Subsidiaries	-.0381328	-.0094519	.9519123	.9877872
Independent	.0810348	.0179192	1.02923	1.006665
State	.0945175	.0001241	1.094776	1.000121
TECH				
Medium low-t~s	.1164522	.001678	1.254467	1.003325
Medium high--s	-.211331	.0001045	.8359902	1.000089
High-tech in~s	-.5049792	-.011019	.3324869	.9803731
RD2015				
1	.2082867	.0056421	1.503124	1.013047
logwages2015	-.0997247	.0102345	.9871457	1.013854
TFP2015	-.1378965	-.0090628	.9336303	.938248

emp2015	.0558724	.0075184	3.896824	.902008
DEBTS2015	-.0741218	-.0206654	1.020553	.979131

```

333
334      outreg2 using $results\04_bytype\bytype_table_1.tex, append dec(3) ///
>      drop(OWN TECH RD2015 logwages2015 TFP2015 emp2015 DEBTS2015) ///
>      nocon eqdrop(OME 0 OME1 OME2 OME3 TME1 TME2 TME3)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\04_bytype\bytype_table_1.tex
dir : seeout

```

```

335
336
337
338
339 *****
340 *          PART 2: Seperate Logit Models
341 *****
342
343 *-----*
344 *          PART 2.1:          AIPW Logit
345 *-----*
346
347 *=====*
348 * Type 1 (Exports-oriented FDI)
349 *=====*
350 //          Type 0: No FDI
351
352      teffects aipw (TFPS17 i.($F) c.($C) ) (FDI2016 c.($C) i.($F) ) ///
>          if FDITYPE2016==1 | FDITYPE2016==0

```

```

Iteration 0:  EE criterion = 9.258e-22
Iteration 1:  EE criterion = 2.861e-33

```

```

Treatment-effects estimation          Number of obs      =      7,803
Estimator      : augmented IPW
Outcome model   : linear by ML
Treatment model: logit

```

TFPS17	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.1404936	.0065984	21.29	0.000	.1275609	.1534263
<b>POMean</b>						
FDI2016 0	-.0124852	.0114371	-1.09	0.275	-.0349014	.009931

```

353
354      tebalance summarize

```

Covariate balance summary

	Raw	Weighted
Number of obs =	7,803	7,803.0
Treated obs =	940	3,925.4
Control obs =	6,863	3,877.6



	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
logwages2015	-.1833482	-.0716673	.9447749	.8859531
TFP2015	-.2141912	-.0226294	.9704629	1.017289
emp2015	.0249499	.1195926	.3077821	1.358915
DEBTS2015	-.0665162	.0552287	1.024821	.9583953
OWN				
Subsidiaries	.029319	-.0418346	1.037004	.9471116
Independent	.0711904	-.0755765	1.026993	.9630798
State	.0619914	.0531902	1.064555	1.053691
TECH				
Medium low-~s	.0789971	-.0161178	1.173675	.9655996
Medium high-~s	-.2663044	-.0297073	.7842619	.9791179
High-tech in-~s	-.5946766	.0462235	.222571	1.062059
RD2015				
1	-.1977282	.0875198	.5536423	1.221739

```

355
356      outreg2 using $results\04_bytype\bytype_table_1.tex, append dec(3) ///
>      drop(OWN TECH RD2015 logwages2015 TFP2015 emp2015 DEBTS2015) ///
>      nocon egdrop(OME0 OME1 TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\04_bytype\bytype_table_1.tex
dir : seecout

```

```

357
358
359 *=====
360 * Type 2(Technology intensive FDI)
361 *=====
362
363      teffects aipw (TFPS17 i.($F) c.($C) ) (FDI2016 c.($C) i.($F) ) ///
>      if FDITYPE2016==2 | FDITYPE2016==0

```

Iteration 0: EE criterion = **6.471e-24**  
Iteration 1: EE criterion = **2.692e-33**

Treatment-effects estimation Number of obs = **8,418**  
Estimator : **augmented IPW**  
Outcome model : **linear by ML**  
Treatment model: **logit**

TFPS17	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
<b>ATE</b>						
FDI2016 (1 vs 0)	.1393538	.0048889	28.50	0.000	.1297718	.1489358
<b>POMean</b>						
FDI2016 0	-.0249796	.011	-2.27	0.023	-.0465391	-.00342



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376

tebalance summarize

Covariate balance summary

		Raw	Weighted
	Number of obs =	8,828	8,828.0
	Treated obs =	1,965	4,386.6
	Control obs =	6,863	4,441.4

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
logwages2015	-.0997247	.0143064	.9871457	1.018875
TFP2015	-.1378965	-.0343519	.9336303	.9395222
emp2015	.0558724	.0171481	3.896824	.9394148
DEBTS2015	-.0741218	-.0281171	1.020553	.9867092
OWN				
Subsidiaries	-.0381328	-.0225617	.9519123	.9708481
Independent	.0810348	.0149455	1.02923	1.005709
State	.0945175	.0189725	1.094776	1.018936
TECH				
Medium low-tech	.1164522	.0025253	1.254467	1.005217
Medium high-tech	-.211331	-.0033973	.8359902	.9975718
High-tech in-tech	-.5049792	-.0136332	.3324869	.9796925
RD2015				
1	.2082867	.0082827	1.503124	1.017821

377

```
378      outreg2 using $results\04 bytype\bytype table 1.tex, append dec(3) ///
>      drop(OWN TECH RD2015 logwages2015 TFP2015 emp2015 DEBTS2015) ///
>      nocon eqdrop(OME0 OME1 TME1)
C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdimatchin
> g_deleteEXP\04_results\04_bytype\bytype_table_1.tex
dir : seeout
```

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end of do-file

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```
      log close
      name: <unnamed>
      log: C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometri
> cs\fdimatching_deleteEXP\log_fdi_matching.smcl
      log type: smcl
      closed on: 10 May 2020, 20:57:05
```