Applied Microeconometrics - ECON4008

Group Project A

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 approach 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 seven and eight 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 probability 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 acquisitions.

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,

however, 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 invested in Research and Development in 2015.

Table 2: Summary Statistics of Categorical Covariates

	Abs. Freq.	Rel. Freq.
Port[a]		
No	7,366	65.05
Yes	3,957	34.95
Ownership		
Listed company	909	8.03
Subsidiary	2,630	23.23
Independent	4,593	40.56
State owned	3,191	28.18
Technology Intensity		
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
R&D[b]		
No	9,951	87.88
Yes	1,372	12.12

[a] Indicates whether a firm has access to a port within 500km.
[b] Indicates whether a firm has invested in R&D in 2015.

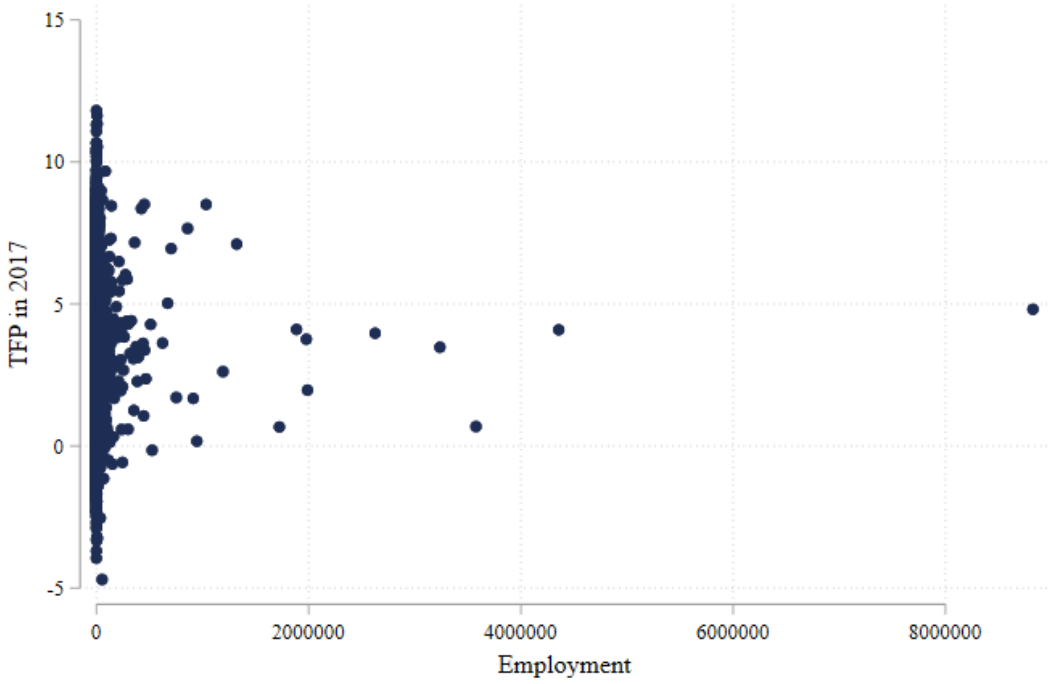
Table 3: Summary Statistics of Continuous Covariates

	Mean	Median	Sd	Min	Max
Wages	1,967[a]	1,538	50,990[a]	0.00065	5,519,000[a]
TFP	3.041	3.032	2.047	-5.359	11.36
Employment	7,111	81.39	117,155	0.00197	8,824[a]
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.
[a] In Thousands

The summary statistics of the continuous variables, i.e. wages, total-factor productivity (TFP), firm size[1], 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



[1]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	1.838	0.728***
	(0.014)	(0.015)	
Access to port	0.273	0.467	-0.194***
	(0.005)	(0.007)	
Log wages	7.529	7.031	0.498***
	(0.046)	(0.057)	
TFP	3.185	2.821	0.364***
	(0.025)	(0.030)	
Log employment	3.766	5.405	-1.639***
	(0.037)	(0.041)	
Log debts	0.511	0.493	0.019***
	(0.004)	(0.005)	
Export intensity	0.131	0.204	-0.073***
	(0.001)	(0.001)	
R&D dummy	0.117	0.128	-0.012*
	(0.004)	(0.005)	
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.

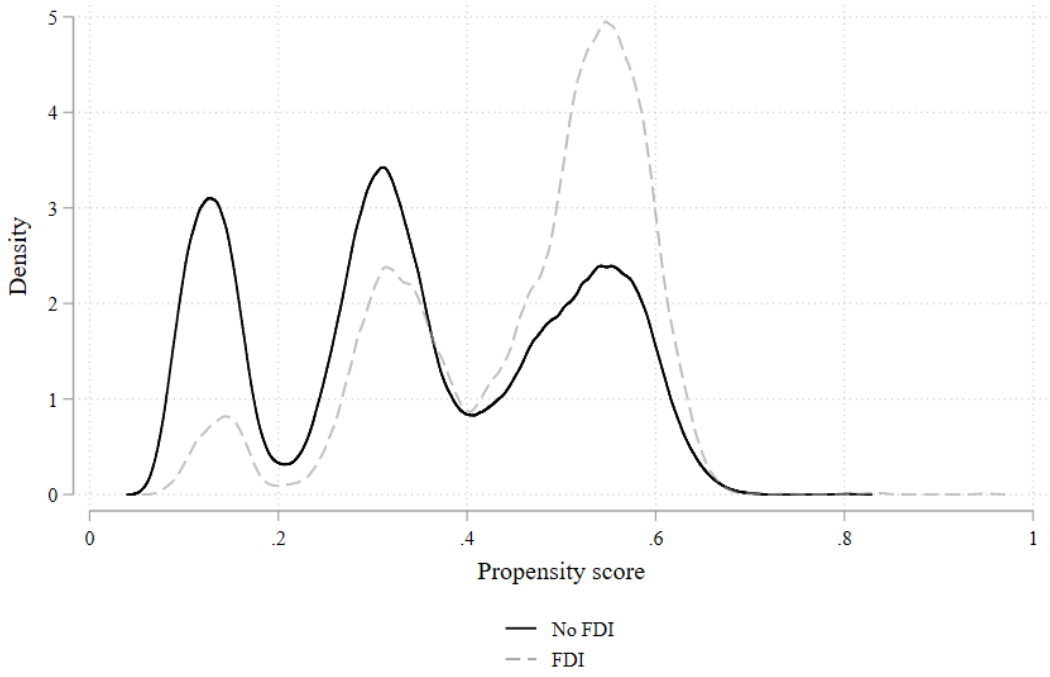
3. Empirical Specification

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 (Caliendo and Kopeinig, 2008). 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 are discussed in more detail below.

Figure 2: Propensity Score Overlap in Main Model



The first two models are estimated using 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), in which observations are weighted 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 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 size.

Table 5: ATE of FDI on TFP

	NN1	NN5	IPW	AIPW
	(1)	(2)	(3)	(4)
FDI2016	0.130***	0.114***	0.122***	0.142***
	(0.015)	(0.011)	(0.007)	(0.003)
PO Means			-0.068***	-0.057***
			(0.010)	(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 neighbours 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 three 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 Appendix 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 throughout 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.[2] 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.

[2]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***	0.127***	0.125***	
	(0.016)	(0.015)	(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 that including this variable does not change our results significantly. 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 neighbour 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 for those firms that actually received treatment. Because

selection into treatment is not 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 ATE. 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 received FDI in 2016 (see Appendix A.1). 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	Medium Low-Tech Industry	Medium High-Tech Industry	High-Tech Industry
	(1)	(2)	(3)	(4)
FDI2016	0.160***	0.086***	0.172***	0.180***
	(0.020)	(0.028)	(0.019)	(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

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.[3] 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 dissimilar in other covariates, 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.

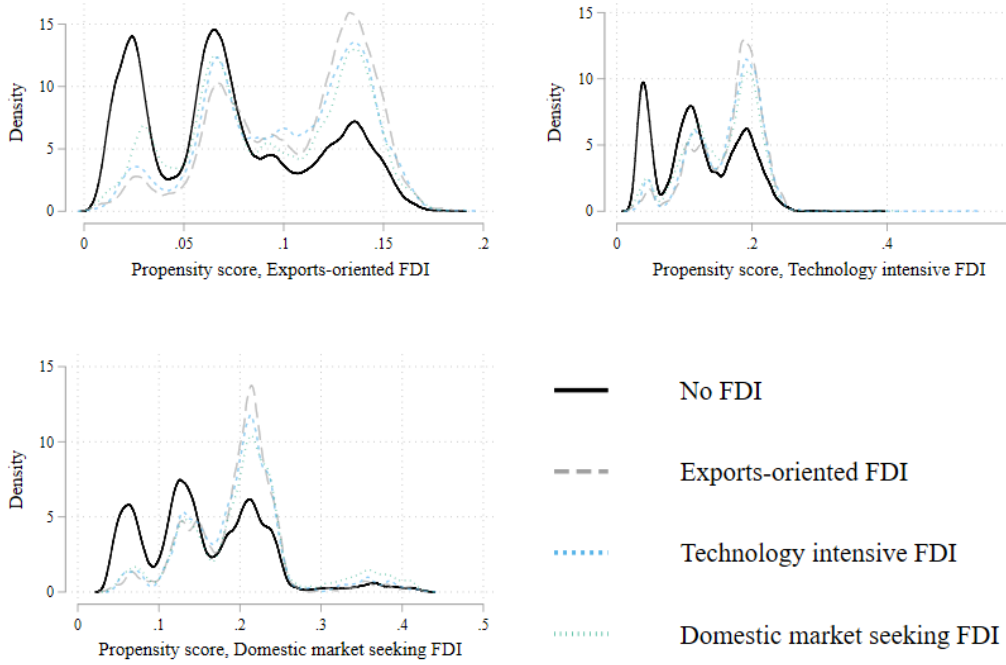
4.3. Analysis by Type of FDI

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 propsensity score and regression adjustment model specifications are the same as that of our main mdoel. The model yields good covariate balance (see Appendix 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 mulitnomial 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.

[3] 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 more robust than the IPW estimator, we take these results to suggest 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***	0.157***	0.140***		
	(0.006)	(0.032)	(0.007)		
Technology intensive FDI	0.139***	0.112***		0.139***	
	(0.005)	(0.018)		(0.005)	
Domestic market seeking FDI	0.143***	0.134***			0.143***
	(0.004)	(0.011)			(0.004)
PO Means	-0.057***	-0.068***	-0.012	-0.025**	-0.017
	(0.009)	(0.010)	(0.011)	(0.011)	(0.011)
Observations	11,323	11,323	7,803	8,418	8,828

Note: Columns (1) and (2) report the coefficients of the multinominal augmented inverse probability and multinominal 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) Abs.	(2) Rel.(%)	(3) Cum.(%)	(4) Abs.	(5) Rel.(%)	(6) Cum.(%)
Technology Intensity						
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
Total	**6863**	**60.6**		**4460**	**39.4**	

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
  file C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\fdima
  > 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. /*******************************************************************************
  >                                                  DESCRIPTIVE ANALYSIS DO-FILE
  > ********************************************************************************
  >
  >                       Applied Microeconometrics
  >
  >                                       Empirical Project
  >
  >                                                       Do-File 02
  >
  >                 PURPOSE:        Analysis of Dataset
  >
  >                 OUTLINE:        PART 1: Overview
  >                                         PART 2: Summary Statistics
  >                                         PART 3: Balance Tables
  >
  > ********************************************************************************
  >                                         PART 1: Overview
  > ********************************************************************************/
```

```
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                          10 May 2020 20:54
   size:       713,349
  ------------------------------------------------------------------------------------
                storage   display    value
  variable name   type    format     label      variable label
  ------------------------------------------------------------------------------------
  firm            float   %9.0g                 firm identifier
  FDI2016         byte    %9.0g                 FDI/TREATMENT dummy in 2016
  FDITYPE2016     byte    %28.0g     FDITYPE     FDI type
  OWN             byte    %17.0g     OWN        Ownership
  TECH            byte    %27.0g     TECH       Technology intensity
  PORT            byte    %21.0g     PORT       Access to port
  logwages2015    float   %9.0g                 Log wages
  TFP2015         float   %9.0g                 TFP
  logemp2015      float   %9.0g                 Log employment
  DEBTS2015       float   %9.0g                 Log debts
  EXP2015         float   %9.0g                 Export intensity
  RD2015          byte    %9.0g                 R&D dummy
  logwages2017    float   %9.0g                 Log wages
  TFP2017         float   %9.0g                 TFP
  logemp2017      float   %9.0g                 log employment in 2017
  EXP2017         float   %9.0g                  EXPORT INTENSITY in 2017
  RD2017          byte    %9.0g                  R&D dummy in 2017
  TFPS17          float   %9.0g
  emp2015         float   %9.0g
  wages15         float   %9.0g
  debts15         float   %9.0g
  ------------------------------------------------------------------------------------
  Sorted by: FDI2016

70.
71. //      Frequencies of FDI types
72.         tab FDITYPE2016

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

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

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

Log employment

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

Log debts

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

Export intensity

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

R&D dummy

	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	.1211693
		Largest	Std. Dev.	.3263383
75%	0	1		
90%	1	1	Variance	.1064967
95%	1	1	Skewness	2.321808
99%	1	1	Kurtosis	6.390791

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\fdimatching_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	**7,366**	**65.05**	**65.05**
Ports within 500km	**3,957**	**34.95**	**100.00**
Total	**11,323**	**100.00**	

```
90.         tab OWN
```

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

```
91.         tab TECH
```

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

```
92.         tab RD2015
```

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

```
93.
94. *-------------------------------------------------------------------------------*
95. *       PART 2.1: Checking for Outliers in employment variable
96. *-------------------------------------------------------------------------------*
97.
98.         set scheme plotplainblind

99.         scatter TFP2017 emp2015, ytitle("TFP in 2017")

100         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 iebaltab        TECH PORT ///
  >                       logwages2015 TFP2015 logemp2015 DEBTS2015 EXP2015 RD2015, //
  > /
  >                       grpvar(FDI2016) ///
  >                       savetex("$results/02_Descriptive_Analysis/baltest_byfdi_pre.
  > tex") ///
  >                       rowvarlabels texdoc replace
    Balance table saved to:
        C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\
        > fdimatching_deleteEXP/04_results/02_Descriptive_Analysis/baltest_byfdi_pre
        > .tex

111
112
113 //                      By FDI type (treatment arms) [not reported in paper]
114 iebaltab        TECH PORT ///
  >                       logwages2015 TFP2015 logemp2015 DEBTS2015 EXP2015 RD2015, //
  > /
  >                       grpvar(FDITYPE2016) ///
  >                       savetex("$results/02_Descriptive_Analysis/baltest_fditype_pr
  > e.tex") ///
  >                       rowvarlabels texdoc replace
    Balance table saved to:
        C:\Users\Emilie\Documents\Emilie\Master\Nottingham\2_Appl_Microeconometrics\
        > fdimatching_deleteEXP/04_results/02_Descriptive_Analysis/baltest_fditype_p
        > re.tex

115
  end of do-file

116
117
118 ********************************************************************************
119 *                       PART 3: Results
120 ********************************************************************************
121
122 *-------------------------------------------------------------------------------*
123 *       PART 3.1: Effect of FDI on TFP
124 *-------------------------------------------------------------------------------*
125
126                 do $scripts/03a_Main_Results

127 /*******************************************************************************
  >                                                       MAIN RESULTS DO-FILE
  > ********************************************************************************
  >
  >                       Applied Microeconometrics
  >
  >                                       Empirical Project
  >
  >                                                       Do-File 03a
  >
  >                 PURPOSE:        Estimation of the effect of FDI on TFP.
  >
  >                 OUTLINE:        PART 1: Several ATE estimations for     main model
  >                                         PART 1.1: NN1
  >                                         Part 1.2: NN5 with caliper 0.05
  >                                         Part 1.3: IPW
  >                                         Part 1.4: AIPW
  >
  > ********************************************************************************
  >                       PART 1: Several ATE estimations for     main model
  > ********************************************************************************/
```

```
*---------------------------------------------------------------------------*
*       PART 1.1: NN1
*---------------------------------------------------------------------------*

        //ATE
        cap drop osa1

        cap drop p1*

        cap teffects psmatch (TFPS17) ///
>                                         (FDI2016 i.($F) c.($C), logit),        ///
>                                          osample(osa1) generate(p1)


        outreg2 using $results/05_Tables/Table2_TFP.tex, replace 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


        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-t~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

```

*---------------------------------------------------------------------------*
*       PART 1.2: NN5 with caliper 0.05
*---------------------------------------------------------------------------*
>
```

```
145                 // ATE
146         cap drop osa1

147         cap drop p1*

148         cap teffects psmatch (TFPS17) ///
  >                                                 (FDI2016 i.($F) c.($C), logit), ///
  >                                                nneighbor(5) caliper(.05) osample(os
  > a1) generate(p1)

149                                                 // 5 observations violate caliper
150
151         // Reestimate
152         cap teffects psmatch (TFPS17) ///
  >                                                  (FDI2016 i.($F) c.($C), logit) if o
  > sa1==0,     ///
  >                                                  nneighbor(5) caliper(.05)  generate
  > (p1)

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-t~s	**.1209652**	**-.0328628**	**1.263818**	**.9372059**
Medium high-~s	**-.2325048**	**.0081591**	**.816095**	**1.006628**
High-tech in~s	**-.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 osa1

163
164         teffects ipw (TFPS17) (FDI2016 i.($F) c.($C), logit),   osample(osa1)

  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]
ATE						
FDI2016 (1 vs 0)	**.1221664**	**.0068002**	**17.97**	**0.000**	**.1088383**	**.1354945**
POmean						
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 Raw	Weighted	Variance ratio 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**

```
168
169 *------------------------------------------------------------------------------*
170 *       PART 1.4: AIWP
171 *------------------------------------------------------------------------------*
  >
172         // ATE
173         cap drop osa1

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]
ATE						
FDI2016 (1 vs 0)	.2918229	.0061911	47.14	0.000	.2796885	.3039572
POmean						
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 Raw	Weighted	Variance ratio 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 /*******************************************************************************
  >                                                              ROBUSTNESS DO-FILE
  > *******************************************************************************
  >
  >                         Applied Microeconometrics
  >
  >                                       Empirical Project
  >
  >                                                   Do-File 03b
  >
  >                 PURPOSE:        Robustness Checks.
  >
  >                 OUTLINE:        PART 1: Including Interactions
  >                                         PART 2: Excluding Outliers
  >                                         PART 3: Including PORT
  >                                         PART 4: ATT
  >                                         PART 5: Analysis by TECH
  >                                         PART 6: Appendix: Frequency of FDI by TECH
  >
  > *******************************************************************************
  >                          PART 1: Including Interactions
  > *******************************************************************************/
190
191         cap drop osa1

192         cap drop p1*

193         teffects psmatch (TFPS17) ///
  >                                       (FDI2016 i.($F)##c.($C), logit),       ///
  >                                        osample(osa1) generate(p1)
```

Treatment-effects estimation — Number of obs = **11,323**
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]	
ATE						
FDI2016 (1 vs 0)	**.1520598**	**.0157615**	**9.65**	**0.000**	**.1211679**	**.1829518**

```
194
195         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	-.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_Microeconometrics\fdimatchin
  > g_deleteEXP/04_results/05_Tables/Table6_Robustness.tex
  dir : seeout

198
199 ********************************************************************************
200 *                        PART 2: Excluding Outliers
201 ********************************************************************************
202
203         cap drop osa1

204         cap drop p1*

205         cap teffects psmatch (TFPS17) ///
  >                                                (FDI2016 i.($F) c.($C), logit) if e
  > mp2015<4000000,             ///
  >                                                osample(osa1) generate(p1)

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 Raw	Matched	Variance ratio 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 osa1

218         cap drop p1*

219         cap teffects psmatch (TFPS17) ///
  >                                      (FDI2016 i.($P) c.($C), logit),        ///
  >                                       osample(osa1) generate(p1)

220
221         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**	**-.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 osa1

230         cap drop p1*

231         cap teffects psmatch (TFPS17) ///
  >                                                (FDI2016 i.($F) c.($C), logit), atet
  >     ///
  >                                                osample(osa1) 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 osa1

246         cap drop p1

247         teffects psmatch (TFPS17) ///
  >                                          (FDI2016  i.($F) c.($C), logit) if TECH==1,
  >     ///
  >                                           osample(osa1) generate(p1)
  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]
ATE						
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 osa1

258         cap drop p1

259         teffects psmatch (TFPS17) ///
  >                                        (FDI2016  i.($F) c.($C), logit) if TECH==2,
  >     ///
  >                                         osample(osa1) generate(p1)
  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]
ATE						
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 Raw	Matched	Variance ratio 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 osa1

270         cap drop p1

271         teffects psmatch (TFPS17) ///
  >                                          (FDI2016  i.($F) c.($C), logit) if TECH==3,
  >     ///
  >                                           osample(osa1) generate(p1)
  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]
ATE						
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 osa1

282         cap drop p1

283         teffects psmatch (TFPS17) ///
  >                                        (FDI2016  i.($F) c.($C), logit) if TECH==4,
  >     ///
  >                                         osample(osa1) generate(p1)
  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]
ATE						
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 Raw	Matched	Variance ratio 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 0	1	Total
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}{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&&4460&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: Multinnominal Logit Models
  >                                                 1.1: AIPW
  >                                                 1.2: IPW
  >                                          PART 2: Seperate Models
  >                                                 2.1 AIPW
  >
  > ********************************************************************************
  >                         PART 1: Mulitnominal 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]
ATE						
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
POmean						
FDITYPE2016 No FDI	-.0565761	.0094884	-5.96	0.000	-.0751731	-.0379792

```
314
315         tebalance summarize
```

Covariate balance summary

Treatment		Observations 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 Raw	Weighted	Variance ratio Raw	Weighted
Exports-orien~I				
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
Technology in~I				
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
Domestic mark~I				
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]
ATE						
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**
POmean						
FDITYPE2016 No FDI	**-.0684059**	**.0096686**	**-7.08**	**0.000**	**-.0873559**	**-.0494558**

```
331
332         tebalance summarize
```

Covariate balance summary

Treatment		Observations 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 Raw	Weighted	Variance ratio Raw	Weighted
Exports-orien~I				
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
Technology in~I				
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
Domestic mark~I				
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]
ATE						
FDI2016 (1 vs 0)	**.1404936**	**.0065984**	**21.29**	**0.000**	**.1275609**	**.1534263**
POmean						
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-t~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 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

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]
ATE						
FDI2016 (1 vs 0)	**.1393538**	**.0048889**	**28.50**	**0.000**	**.1297718**	**.1489358**
POmean						
FDI2016 0	**-.0249796**	**.011**	**-2.27**	**0.023**	**-.0465391**	**-.00342**

```
364
365         tebalance summarize
```

Covariate balance summary

	Raw	Weighted
Number of obs =	**8,418**	**8,418.0**
Treated obs =	**1,555**	**4,169.7**
Control obs =	**6,863**	**4,248.3**

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
logwages2015	**-.1365085**	**-.0165004**	**.9818968**	**1.025628**
TFP2015	**-.2091214**	**-.0607962**	**.9481316**	**.9409475**
emp2015	**.0498435**	**.037521**	**10.65892**	**1.875564**
DEBTS2015	**-.0186904**	**-.0532078**	**1.105096**	**1.091496**
OWN				
Subsidiaries	**-.0227822**	**.0006329**	**.9717411**	**1.000803**
Independent	**.0312067**	**-.017564**	**1.013148**	**.992243**
State	**.1341894**	**.0387922**	**1.12989**	**1.037702**
TECH				
Medium low-t~s	**.1501373**	**.0029158**	**1.327181**	**1.006**
Medium high-~s	**-.2403611**	**-.0057285**	**.8089302**	**.9959361**
High-tech in~s	**-.5607553**	**-.0217103**	**.2633246**	**.9682538**
RD2015				
1	**-.0894951**	**.0036693**	**.7908312**	**1.009067**

```
366
367         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

368
369
370 *====================================*
371 * Type 3(Domestic market seeking FDI)
372 *====================================*
373
374         teffects aipw (TFPS17   i.($F) c.($C) )(FDI2016 c.($C) i.($F)  ) ///
  >                 if FDITYPE2016==3 | FDITYPE2016==0

  Iteration 0:   EE criterion =  7.443e-19
  Iteration 1:   EE criterion =  2.227e-33

  Treatment-effects estimation                    Number of obs     =      8,828
  Estimator      : augmented IPW
  Outcome model  : linear by ML
  Treatment model: logit
```

TFPS17	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ATE						
FDI2016 (1 vs 0)	**.1428096**	**.0042927**	**33.27**	**0.000**	**.1343961**	**.1512231**
POmean						
FDI2016 0	**-.0173178**	**.0107047**	**-1.62**	**0.106**	**-.0382987**	**.0036632**

```
375
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-t~s	.1164522	.0025253	1.254467	1.005217
Medium high-~s	-.211331	-.0033973	.8359902	.9975718
High-tech in~s	-.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

379
380
381
382
383
384
  end of do-file

385
386
387
388         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
```