

# Firms' participation to global value chains and employment growth

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# Outline

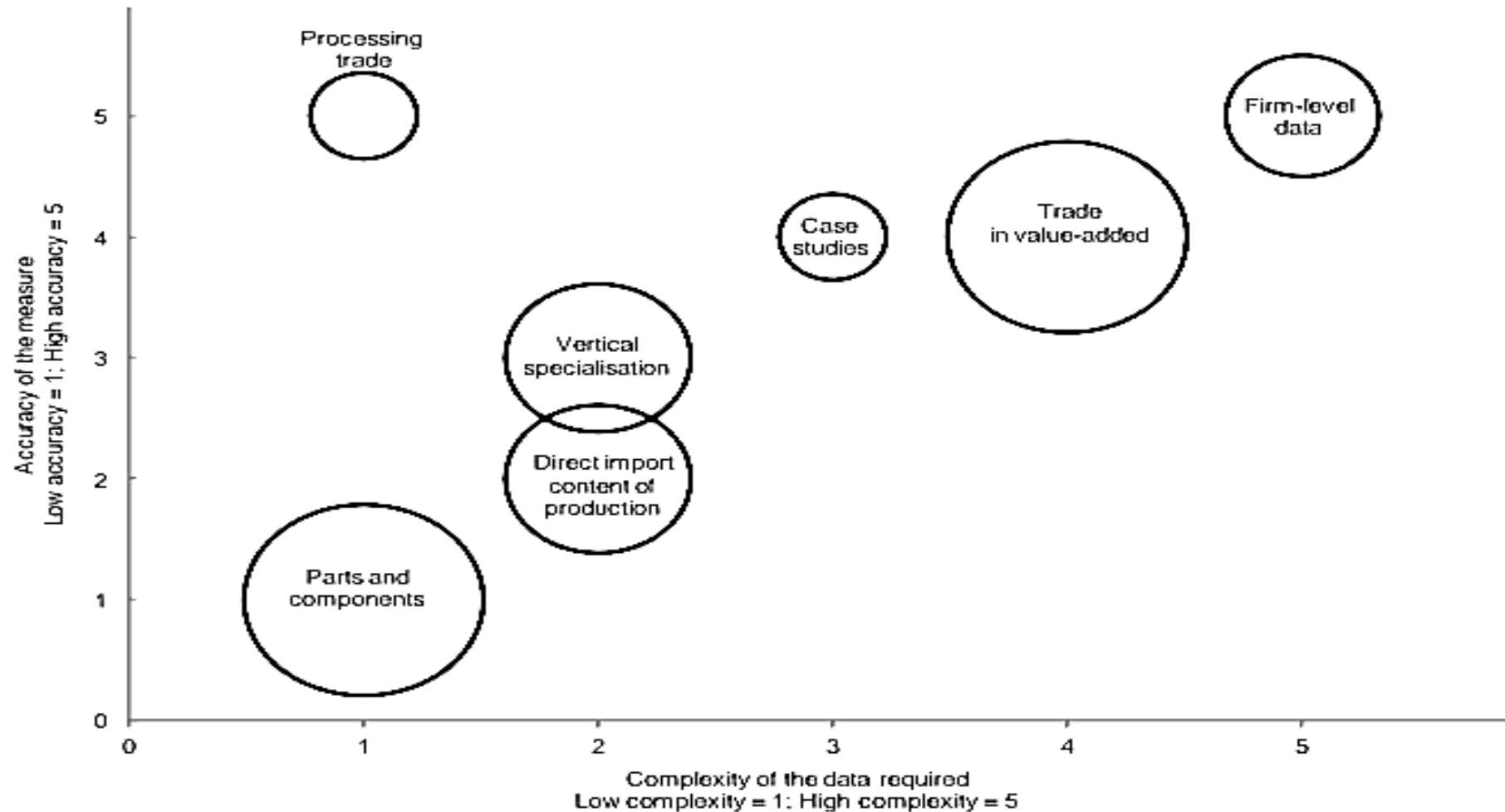
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# Background

# What are global value chains (GVCs)?

- Value chain (VC) = *“the full range of activities required to bring a product or service from conception through the different phases of production, delivery to final consumers, and final disposal after use”*. (Sturgeon, 2013, p. 11)
- ICT revolution → globalization’s 2° unbundling: fragmentation of production processes (Baldwin, 2011).
- Creation of an infrastructure of international production, which has fostered trade in intermediates (Feenstra, 1998).

# GVCs and firms' performance: what do we know? (1)



Source: Amador and Cabral, 2014.

# GVCs and firms' performance: what do we know? (2)

- Productivity positively related to GVC participation (e.g. Veugelers *et al.*, 2013; Agostino *et al.*, 2016; Montalbano *et al.*, 2018;).
- Positive and significant association between participation to VCs and both the probability of export and the intensive margin of trade, especially for downstream firms (Giovannetti *et al.*, 2015; Giovannetti and Marvasi, 2016).
- Positioning matters: suppliers suffering from 'subcontracting discount' with respect to final firms (e.g. Razzolini and Vannoni, 2011; Accetturo *et al.*, 2011).
- Bridgeable gap intermediate-final firms:
  - internationalization, innovation (e.g. Veugelers *et al.*, 2013; Agostino *et al.*, 2015);
  - partnerships or close relationships with other players of the VC (Wynarczyk and Watson, 2005; Pietrobelli and Saliola, 2008) → governance matters, too.

# What about employment growth?

- Little empirical research about the relation between GVC participation and employment growth.
- Theoretically, GVCs boost employment through 3 channels: demand effect, training effect, labour turnover effect (Taglioni and Winkler, 2016).
- ILO (2016): GVCs foster employment creation but might contribute to worsening working conditions. Thesis confirmed by case studies (e.g. Dolan, 2004; Arnold, 2010) → From “economic upgrading” to “social upgrading” (Barrientos, Gereffi, & Rossi, 2011).
- GVC-related firm strategy and employment growth: offshoring (e.g. Desai, Foley, & Hines, 2009; Mankiw & Swagel, 2006).
- Other firms’ characteristics related to employment growth: size and age (Grazzi and Moschella, 2017; Barba Navaretti, Castellani, & Pieri, 2014; Heyman, Norbäck, & Persson, 2017); innovative capacity (e.g. Schreyer, 2000); access to financing (e.g. Rahaman, 2011).

# Firms' GVC participation and positioning and employment growth during the Great Recession



# Firms, GVCs and the Great Recession: what happened?

- 2008: the Great Recession begins; world trade experiences a “sudden, severe and synchronized collapse” (Baldwin, 2009). GVCs might have played a central role in the big trade collapse (e.g. Bems *et al.*, 2009; Alessandria *et al.*, 2011;).
- What happened inside GVCs?
  - Intra-group exchanges in intermediates fell faster – and recovered faster – than arm’s length trade (Altomonte *et al.*, 2012).
  - Worse performance of intermediate firms vs final firms (Accetturo *et al.*, 2011; Accetturo and Giunta, 2017).
  - High-skilled suppliers involved in relational GVC appeared to be more innovative, while other GVC participation modes gave firms no premium compared to exclusively domestic ones (Brancati *et al.*, 2017).
- Concerning employment, the average number of workers has decreased in the European firms (Altomonte and Favoino, 2016). There were more lay-offs within companies with many unskilled employees and part-time workers (Békés *et al.*, 2011).

# Research question and data

- Aim of the research:

investigating whether and how GVC participation is related to employment growth at the firm level, looking at the variation experienced by companies after the Great Recession (2008-2014). Focus on firms located in France, Germany, Italy and Spain.

- Data:

the EU-EFIGE/Bruegel-UniCredit dataset (in short, the EFIGE dataset).

Data collected in 2010, referring to years 2007-2009. Update available for years 2009-2014 for balance sheet information only. The EFIGE dataset provides information on almost 15.000 manufacturing companies (having at least 10 employees) located in 7 European countries. Sectoral disaggregation: 4 digit NACE rev.1.1 industry codes.

# The sample: descriptive analysis (1)

- The Efige dataset provides information about around 11,700 firms located in France, Germany, Italy and Spain. However, due to missing data, our sample consists of 3,778 companies.

Firms' distribution by size and country

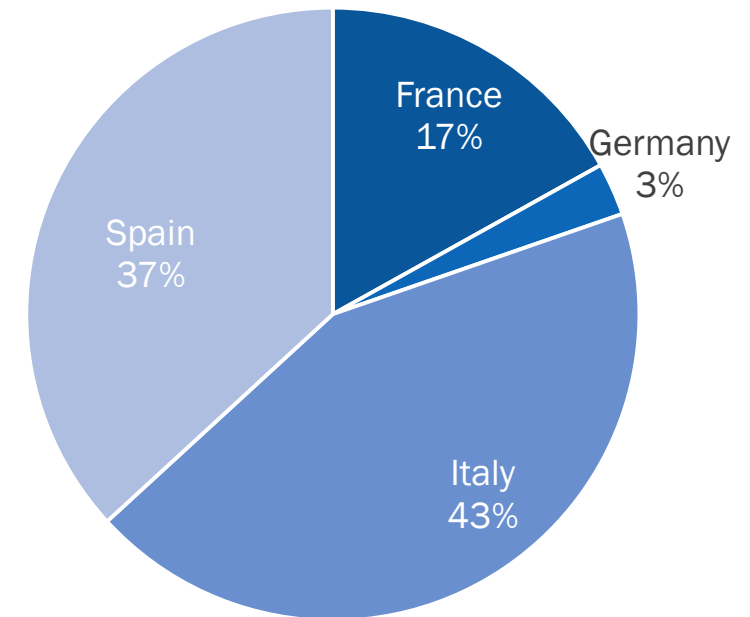
	France		Germany		Italy		Spain	
	N.	%	N.	%	N.	%	N.	%
Small	399	62.44	16	15.24	1,346	81.92	1,167	83.9
Medium	193	30.2	63	60	226	13.76	169	12.15
Large	47	7.36	26	24.76	71	4.32	55	3.95
Total	639	100	105	100	1,643	100	1,391	100

Small: 12-49 employees.

Medium: 50-249 employees.

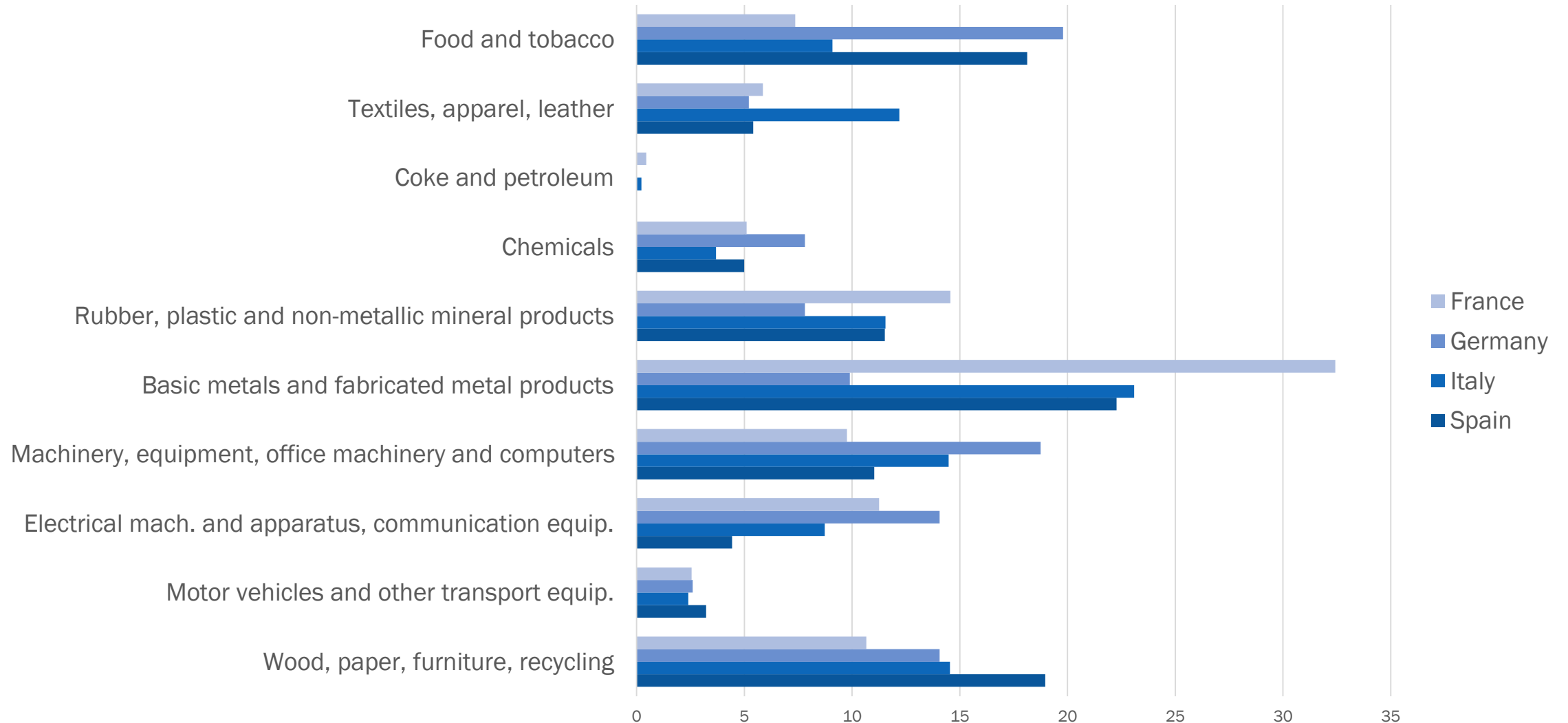
Large: 250 employees or above.

Year: 2008



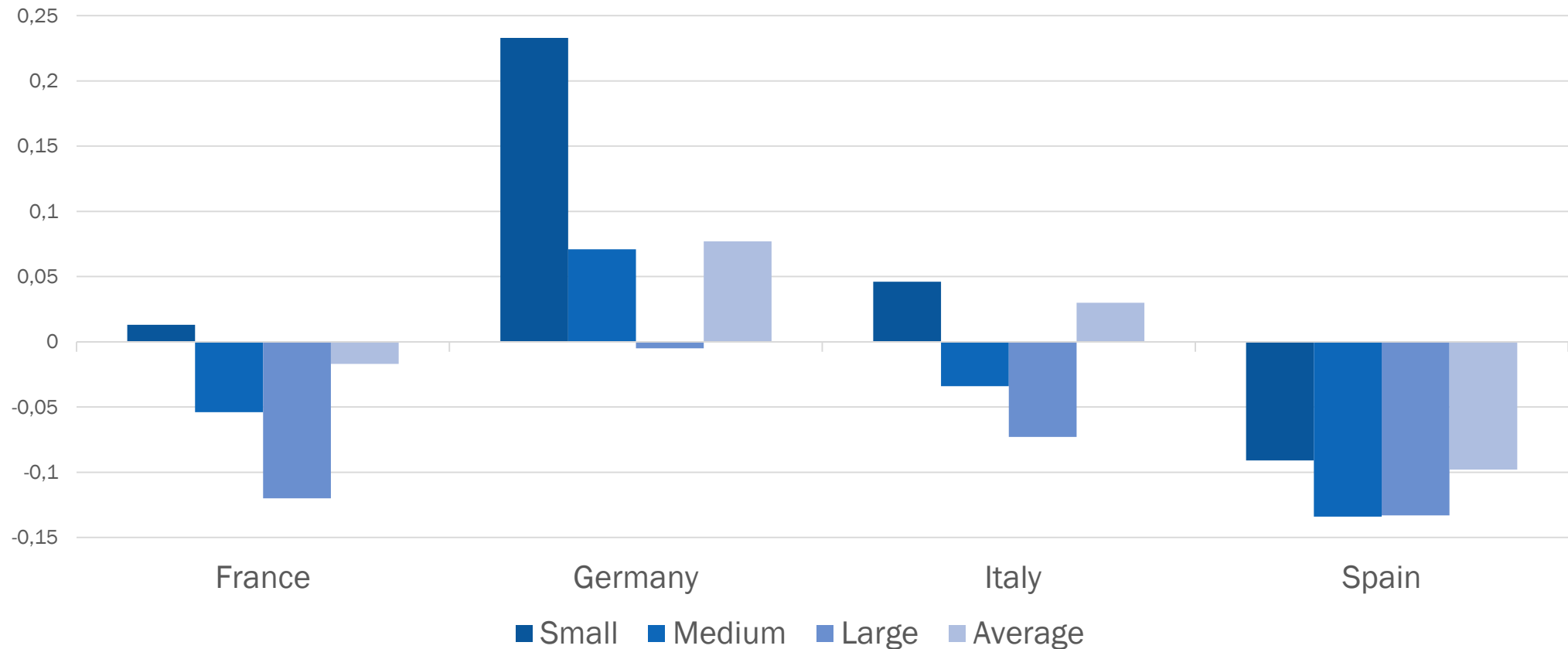
# The sample: descriptive analysis (2)

Firms' distribution by industry and country



# The sample: descriptive analysis (3)

- Variable of interest: employment variation rate= $(\text{employees}_{2014} - \text{employees}_{2008}) / \text{employees}_{2008}$
- Great heterogeneity among firms. Average variation: -2,5%.



# Measuring GVC participation and positioning (1)

- To measure GVC participation, we build on Veugelers *et al.* (2013), but we adopt a stricter definition.
- Specifically, firms can be involved in an international production network:
  - 1) by importing services and intermediate goods;
  - 2) by exporting intermediate goods (towards other firms);
  - 3) by producing abroad (either through FDI or outsourcing contracts) intermediate goods or final goods not destined to the local market.
- The EFIGE dataset provides direct information about (1). We identify (2) as exporters and, at the same time, either being passive outsourcers or earning at least part of their turnover by selling produced-to-order goods. We single out (3) as companies producing abroad either intermediate goods (later imported home) or final goods destined to the home or third countries markets.
- So we distinguish among 3 (mutually exclusive) GVC participation modes: SINGLE, DUAL and TRIPLE. Companies implementing one of them are considered involved in international production networks.

# Measuring GVC participation and positioning (2)

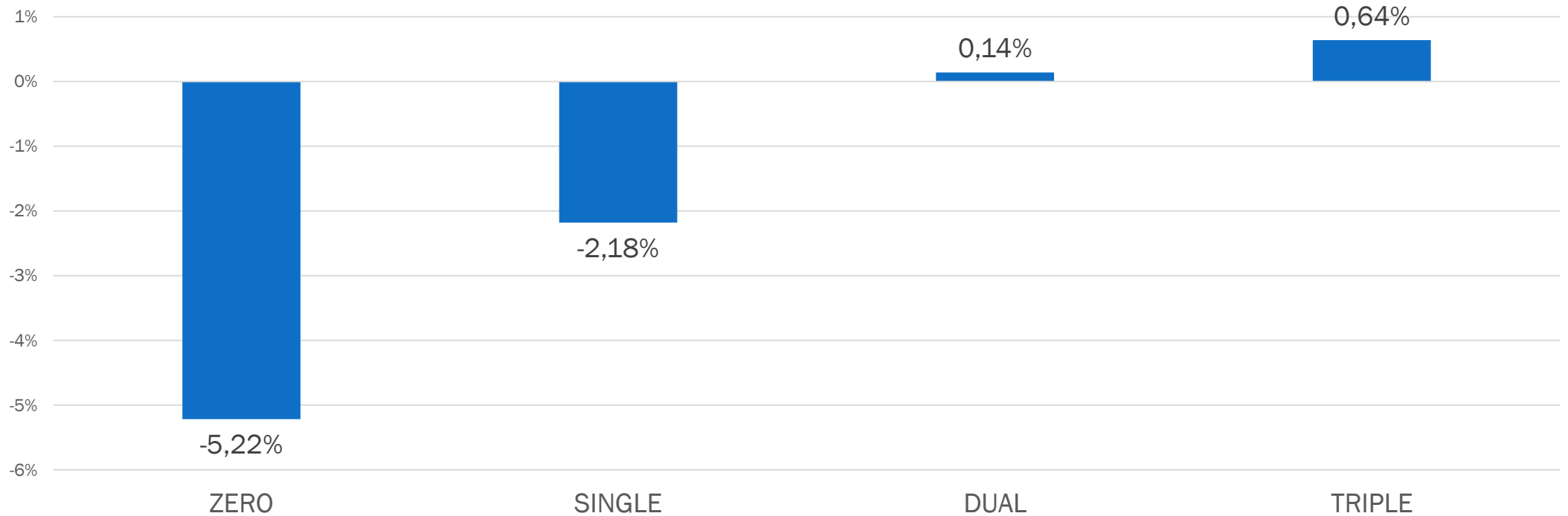
- GVC positioning is measured by looking at the share of turnover originated from selling produced-to-order goods. The higher this share, the more upstream a firm is located. Companies selling exclusively produced-to-order goods are PURE SUPPLIERS (PS).

Country	GVC participation mode			
	ZERO	SINGLE	DUAL	TRIPLE
France	25.67	29.42	39.28	5.63
Germany	39.06	35.94	18.75	6.25
Italy	27.26	41.74	27.49	3.52
Spain	39.21	35.14	24.6	1.05
Total	31.78	37.1	28.04	3.09

	N.	of which, PS (%)
ZERO	1,180	50.12
SINGLE	1,395	55.65
DUAL	1,084	60.11
TRIPLE	119	53.66
TOTAL	3,987	55.08

# Measuring GVC participation and positioning (3)

Average % employment variation based on GVC participation mode





# The empirical investigation (1)

## 1. OLS regressions

- Dependent variable => employment variation:

$$\ln\_employment\_variation = \ln(\text{employees2014}) - \ln(\text{employees2008})$$

- First, we estimate the following equation:

$$\ln\_employment\_variation = \beta_0 + \beta_1 GVC + \beta_2 tfp2008 + \beta_3 \ln age + \beta_4 \ln employees2008 + \beta_5 INNO + \varphi_1 Dc + \varphi_2 Di + \varepsilon$$

- Then, we add further controls:

- training = 1 if employees have undergone training;
- labour\_flex = 1 if firm has used fixed-term or part-time contracts;
- hk = 1 if firm has higher share of graduates with respect to national average in its industry;
- GROUP = 1 if firm belongs to group;
- qual\_cert = 1 if firm has quality certification;
- comp = 1 if firm declares to have foreign competitors;
- EXTERNAL\_FINANCING = 1 if firm has asked for external financing during 2008-2009.

# The empirical investigation (2)

## 1. OLS regressions

	(1)	(2)	(3)	(4)
GVC	0.070*** (0.015)	0.065*** (0.016)	0.065*** (0.016)	0.065*** (0.016)
PTO_turnover	-	-	0.000 (0.000)	-
PURE_SUPPLIER	-	-	-	0.021 (0.015)
tfp2008	0.140*** (0.019)	0.145*** (0.019)	0.145*** (0.019)	0.145*** (0.019)
lnage	-0.026** (0.013)	-0.022* (0.013)	-0.022* (0.013)	-0.021 (0.013)
lnemployees2008	-0.060*** (0.009)	-0.077*** (0.011)	-0.077*** (0.011)	-0.077*** (0.011)
INNO	0.062*** (0.015)	0.051*** (0.015)	0.051*** (0.015)	0.052*** (0.015)
training	-	0.012 (0.015)	0.012 (0.015)	0.012 (0.015)
hk	-	0.005 (0.015)	0.005 (0.015)	0.006 (0.015)
labour_flex	-	0.005 (0.015)	0.005 (0.017)	0.005 (0.017)
GROUP	-	0.053*** (0.021)	0.053*** (0.021)	0.054*** (0.021)
qual_cert	-	0.048*** (0.015)	0.048*** (0.015)	0.047*** (0.015)
foreign_comp	-	-0.005 (0.014)	-0.005 (0.014)	-0.005 (0.014)
EXTERNAL_FINANCING	-	0.040*** (0.014)	0.040*** (0.014)	0.041*** (0.014)
Constant	0.503*** (0.103)	0.469*** (0.102)	0.464*** (0.103)	0.458*** (0.103)
Country dummies	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes
Observations	3,778	3,778	3,778	3,778
R-squared	0.107	0.114	0.114	0.114

# The empirical investigation (3)

## 1. OLS regressions

	(5)	(6)
SINGLE_GVC	0.049*** (0.017)	0.048*** (0.017)
DUAL_GVC	0.104*** (0.018)	0.099*** (0.019)
TRIPLE_GVC	0.062 (0.049)	0.047 (0.049)
tfp2008	0.141*** (0.019)	0.146*** (0.019)
lnage	-0.027** (0.013)	-0.023* (0.013)
lnemployees2008	-0.063*** (0.010)	-0.079*** (0.011)
INNO	0.060*** (0.015)	0.049*** (0.015)
training	-	0.012 (0.015)
hk	-	0.003 (0.015)
labour_flex	-	0.003 (0.017)
GROUP	-	0.052** (0.021)
qual_cert	-	0.047*** (0.015)
foreign_comp	-	-0.009 (0.014)
EXTERNAL_FINANCING	-	0.039*** (0.014)
Constant	0.528*** (0.104)	0.493*** (0.102)
Country dummies	Yes	Yes
Sector dummies	Yes	Yes
Observations	3,778	3,778
R-squared	0.109	0.116

# The empirical investigation (4)

## 2. Robustness checks

- We run our model on a sub-sample of our original data, omitting observations related to German firms. Results hold.
- We run our model on a sub-sample of our original data, considering as GVC participants only ‘substantially internationalized’ firms as in Veugelers *et al.* (2013) → *if their share of international activity (import, export or international production) over total turnover is above the twenty-fifth percentile in their sector.* Results hold.
- We run our model on a sub-sample generated by combining the previous two criteria. Results hold.
- Results also hold when using other variables to control for firms’ characteristics (e.g. size or use of external financing).

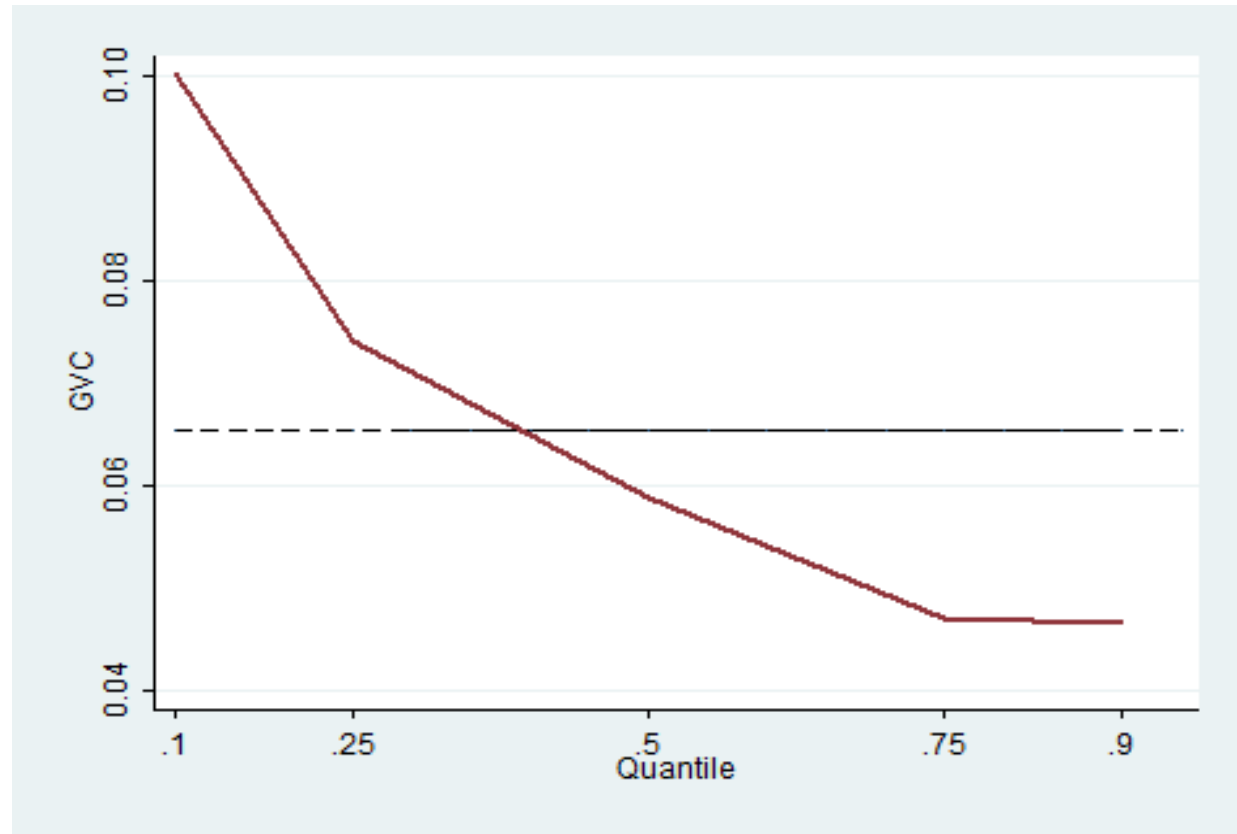
# The empirical investigation (5)

## 3. Tackling heterogeneity: (simultaneous) quantile regressions

	Equation (2)				
	10%	25%	50%	75%	90%
GVC	0.100*** (0.034)	0.074*** (0.017)	0.059*** (0.016)	0.047*** (0.016)	0.047 (0.033)
tfp2008	0.204*** (0.023)	0.156*** (0.016)	0.098*** (0.016)	0.087*** (0.015)	0.076*** (0.027)
lnage	-0.005 (0.019)	-0.016 (0.011)	-0.031*** (0.008)	-0.072*** (0.008)	-0.096*** (0.014)
lnemployees2008	-0.037* (0.020)	-0.041*** (0.004)	-0.043*** (0.009)	-0.036*** (0.008)	-0.072*** (0.014)
INNO	0.023 (0.019)	0.035** (0.016)	0.043*** (0.010)	0.039*** (0.010)	0.044* (0.023)
training	0.013 (0.026)	0.027* (0.015)	0.010 (0.009)	0.004 (0.014)	0.013 (0.022)
hk	0.033 (0.021)	0.009 (0.018)	0.005 (0.014)	0.017 (0.015)	0.015 (0.030)
labour_flex	-0.001 (0.038)	-0.009 (0.020)	-0.001 (0.014)	0.027 (0.020)	-0.009 (0.021)
GROUP	0.015 (0.043)	0.023 (0.020)	0.030* (0.016)	0.020 (0.019)	0.083*** (0.026)
qual_cert	0.035 (0.030)	0.040** (0.016)	0.038*** (0.014)	0.024** (0.011)	0.069*** (0.019)
foreign_comp	0.000 (0.020)	-0.004 (0.013)	0.000 (0.010)	-0.004 (0.014)	0.008 (0.022)
EXTERNAL_FINANCING	0.030 (0.025)	0.027 (0.017)	0.028** (0.013)	0.038*** (0.011)	0.048** (0.019)
Constant	0.026 (0.145)	0.180 (0.116)	0.268** (0.127)	0.658*** (0.175)	1.067*** (0.177)
Country dummies	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes
Observations	3,778	3,778	3,778	3,778	3,778
R-squared	0.117	0.088	0.057	0.048	0.061

# The empirical investigation (6)

## 3. Tackling heterogeneity: (simultaneous) quantile regressions



Variation in the coefficient of GVC participation over the conditional quantiles

# The empirical investigation (7)

## 3. (simultaneous) quantile regressions

	10%	25%	50%	75%	90%
SINGLE_GVC	0.100*** (0.024)	0.066*** (0.025)	0.045*** (0.016)	0.036 (0.022)	0.027 (0.026)
DUAL_GVC	0.147*** (0.048)	0.099*** (0.033)	0.081*** (0.017)	0.062** (0.028)	0.058* (0.030)
TRIPLE_GVC	0.024 (0.119)	0.029 (0.048)	0.028 (0.038)	0.109 (0.073)	0.225** (0.102)
tfp2008	0.201*** (0.025)	0.155*** (0.018)	0.095*** (0.018)	0.085*** (0.016)	0.075*** (0.020)
Inage	-0.019 (0.021)	-0.017 (0.012)	-0.024** (0.010)	-0.071*** (0.011)	-0.099*** (0.014)
Inemployees2008	-0.035** (0.018)	-0.038*** (0.009)	-0.047*** (0.009)	-0.040*** (0.008)	-0.077*** (0.014)
INNO	0.021 (0.025)	0.031* (0.017)	0.042*** (0.012)	0.043*** (0.012)	0.044** (0.022)
training	0.020 (0.020)	0.028* (0.017)	0.014 (0.011)	0.003 (0.011)	0.017 (0.024)
hk	0.021 (0.024)	0.013 (0.017)	0.005 (0.012)	0.013 (0.011)	0.016 (0.026)
labour_flex	-0.002 (0.035)	-0.011 (0.023)	0.001 (0.012)	0.021 (0.014)	0.008 (0.032)
GROUP	0.013 (0.027)	0.013 (0.020)	0.038*** (0.012)	0.027 (0.017)	0.082** (0.035)
qual_cert	0.031 (0.028)	0.037** (0.018)	0.035*** (0.012)	0.027** (0.013)	0.068*** (0.025)
foreign_comp	-0.014 (0.029)	-0.008 (0.022)	-0.007 (0.015)	-0.007 (0.013)	0.002 (0.024)
EXTERNAL_FINANCING	0.032 (0.025)	0.027 (0.017)	0.033** (0.015)	0.040** (0.016)	0.053 (0.034)
Constant	0.111 (0.263)	0.179 (0.182)	0.264** (0.134)	0.654*** (0.170)	1.079*** (0.201)
Country dummies	Yes	Yes	Yes	Yes	Yes
Sector dummies	Yes	Yes	Yes	Yes	Yes
Observations	3,778	3,778	3,778	3,778	3,778
R-squared	0.117	0.089	0.058	0.048	0.062

# The empirical investigation (8)

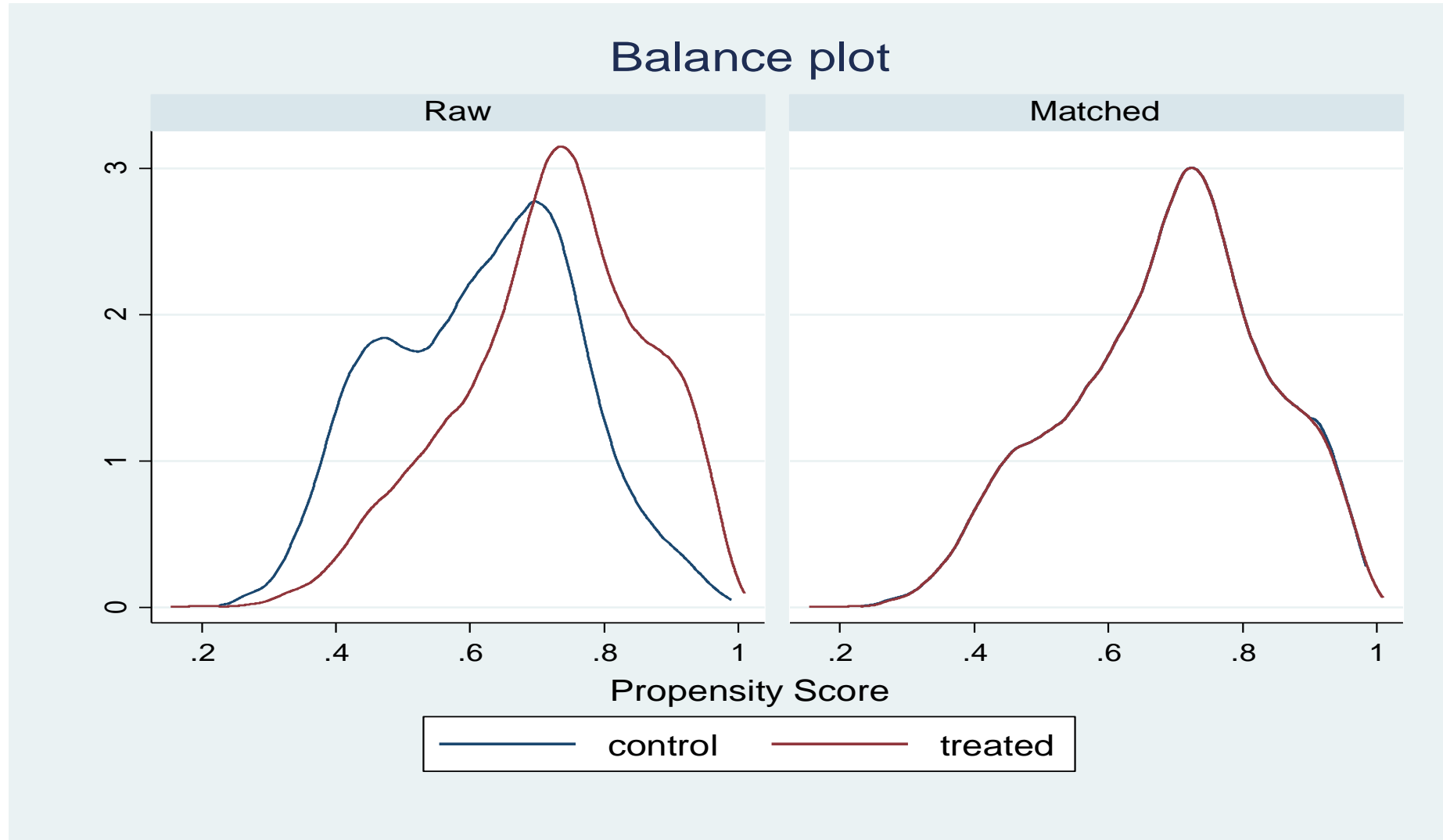
## 4. Borrowing from impact evaluation techniques

- In order to assess GVC participation impact on employment growth, we borrow from impact evaluation techniques and attempt at applying the PS matching.
- These technique overcomes the conterfactual problem in impact evaluation analysis by comparing units with their 'twins' belonging to the same sample having a similar probability to be treated.
- We consider GVC participation as being the treatment and we measure the ATE (Average Treatment Effect)  $\rightarrow ATE(x) = E(y1-y0 | x)$  using the Stata command 'teffects psmatch'.
- X are the confounders, i.e. the variables that we assume as determining the selection into treatment (in our case, being part of a GVC).
- We take into account the following confounders: tfp2008, INNO, GROUP, size\_class, age\_class, country, sector.
- The pairing method that allows us a very good quality of the matching is the nearest neighbour 2.



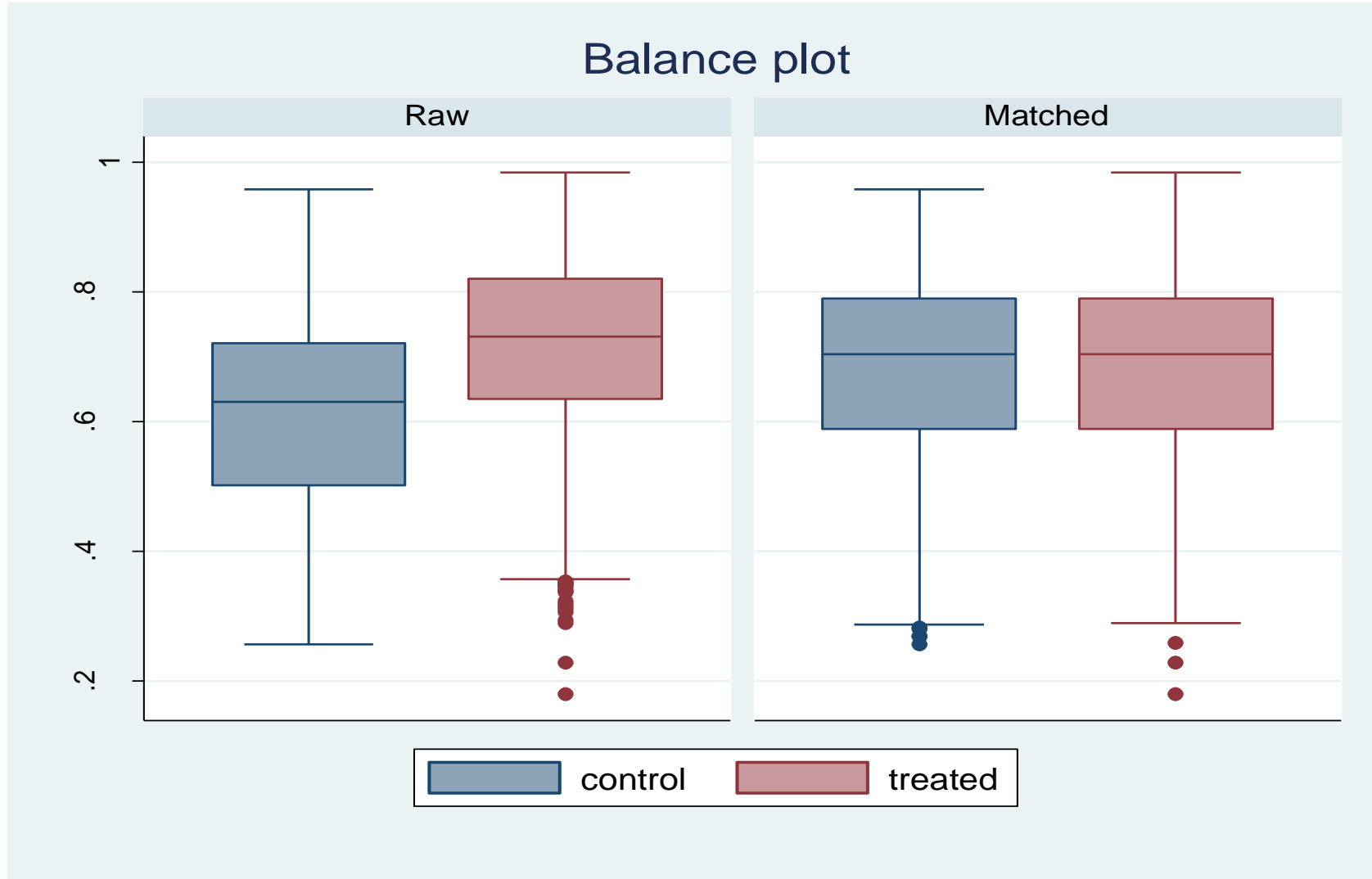
# The empirical investigation (9)

## 4. Borrowing from impact evaluation techniques



# The empirical investigation (10)

## 4. Borrowing from impact evaluation techniques



# The empirical investigation (11)

## 4. Borrowing from impact evaluation techniques

N. Observations	Treated observations	Control observations	ATE (GVC 1 vs 0)
3,778	2,599	1,179	0.076*** (0.017)

	Standardized differences		Variance ratio	
	Raw	Matched	Raw	Matched
tfp2008	-0.245	-0.012	1.324	1.136
size class	0.459	0.005	2.738	1.036
age class	0.177	-0.035	0.856	1.050
INNO	0.450	0.016	0.759	0.988
GROUP	0.296	0.003	1.589	1.003
country_code	-0.222	0.038	1.065	0.842
sector_code	0.143	0.025	0.878	0.940

# Concluding remarks

- GVC participation is significantly and positively related to employment growth, while GVC positioning does not seem to be related with it at the firm level.
- Specifically, mostly SINGLE and DUAL participation modes seem to be significantly and positively associated with employment variation, while TRIPLE participation mode is significant only for those firms with high positive employment variation rates (the ‘gazelles’).
- The PS matching analysis carried out confirms a positive impact of GVC participation on employment growth.
- Main contribution of this work: shedding some light on the relation between GVC participation and employment growth. Scope for further research: quality of jobs created by international production networks.

Thank you for your attention!

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