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does investment promotion work?

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Abstract

Can active investment promotion efforts attract FDI towards areas and sectors that would not otherwise be targeted? This paper leverages an *ad hoc* survey on national and sub-national Investment Promotion Agencies (IPAs) in Europe and applies state-of-the-art policy evaluation methods to estimate the impact of IPAs on FDI attraction. The results show that FDI responds to sub-national IPAs operating in closer proximity to investors' operations. Impact is concentrated in areas where market and institutional failures are stronger and the evidence suggests that this might be driven by actual improvements of the domestic business environment facilitated by sub-national IPAs.

Keywords: Foreign Direct Investment, Investment Promotion, Europe.

JEL codes: F21, F23, O24, R58

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1. Introduction

In a context of increasingly competitive capital markets the attraction of Foreign Direct Investment (FDI) has taken centre stage in public policies world-wide. The establishment of Investment Promotion Agencies (IPAs) has progressively diffused as one of the leading policy initiatives to attract FDI.

Nowadays countries with no active IPAs are only a small minority in the world (OECD, 2015). In addition to national IPAs, whose competence covers an entire country, sub-national IPAs have also become the norm across the globe. The activity of IPAs is now an essential component of both national and local government strategies to attract inward investment. National and sub-national IPAs registered at the World Association of Investment Promotion Agencies (WAIPA) have increased from 112 in 2002 to 170 in 2018.

A consolidated body of economic literature has highlighted the potential benefits from FDI (e.g. Markusen, 1984; Rodriguez-Clare, 1996; Borensztein and De Gregorio, 1998; Markusen and Venables, 1999; Javorcik, 2004; Haskel and Pereira, 2007; Arnold et al., 2011; Poole, 2013). Conversely, more limited is the evidence on the actual capability of active investment promotion to attract foreign capital and shape its global allocation. The scant literature that has looked into Investment Promotion Agencies has not reached a consensus on their effectiveness. Some studies have estimated positive IPA impacts in advanced economies (Bobonis and Shatz, 2007; Charlton and Davis, 2007), others have instead suggested that impacts materialise only in developing economies where red tapes and bureaucratic barriers to investors are predominant (Harding and Javorcik, 2011; 2012; 2013). However, this debate fails to consider the large (and increasing) heterogeneity between and within national economies in terms of FDI location drivers and investment promotion efforts. The literature is silent on the sub-national impacts of national IPAs and – despite the increase in resources and competences devolved to sub-national investment promotion – on the returns to these public policies over and above national efforts.

These gaps become apparent in light of the differential functions and potential impacts of national vs. sub-national IPAs. In pursuing their country-wide mandate, national IPAs might direct foreign investors towards specific sub-national agglomerations, regions or sectors. Sub-national IPAs are fundamentally different from national IPAs in that they are responsible for much smaller jurisdictions, implying more in-depth knowledge of local conditions relevant to investors, closer ties with local governments and other public bodies with decentralised powers, stronger capability to address investors' operational day-to-day bottlenecks on the ground.

This paper revisits the question of the impact of IPAs to explore: a) the capability of national-level investment promotion efforts to deal with the heterogeneity of host economy characteristics both between and within countries; b) the impact of sub-national IPAs, designed to leverage (or compensate for) this heterogeneity in investment conditions. We do so by looking at an economically integrated space – the European Union and its neighbouring countries – which allows to better identify the intrinsic heterogeneity in investment attraction capabilities across countries at different stages of economic and technological development but part of a Single Market with common trade and investment rules.

The paper leverages a newly-developed ad hoc survey on both national and regional (i.e. sub-national) IPAs for a large number of European countries. This dataset makes it possible to capture for the first time the full institutional architecture of the investment promotion efforts that is indeed highly diversified across countries. The specification of *within-countries* models by sub-national units and sectors makes it possible to better control for confounding factors that might affect *between-countries* estimates and capture the heterogeneity of impacts.

Our survey unveils a significant heterogeneity among the different models of investment promotion in Europe. Some countries have adopted a centralised system with no regional agencies (e.g. Greece); other countries rely on both national and regional agencies (in all regions, e.g. Poland, or only in some, e.g. Italy). Other countries have only regional agencies (e.g. Belgium).

The main methodological challenge when attempting to capture the impact of IPAs is the endogeneity of the policy, due to the non-randomness of the investment sectors chosen by the agencies for FDI attraction. We address this empirical issue by relying on state-of-the-art estimation methodologies for policy assessment. We first develop a difference-in-differences model exploiting unique information on the timing of sector-targeting from the agencies. A full battery of interacted fixed effects and time trends allows to minimise confounders and estimate the temporal evolution of the impact. As an alternative strategy to address endogeneity, for each region and sector targeted by IPAs we adopt the synthetic control method to construct counterfactuals replicating their trend in the pre-treatment (i.e. pre-sector-targeting) period.

The results of the difference-in-differences analysis and the synthetic controls study suggest that national IPAs have a limited role to play, either between or within countries. Conversely, our results unveil that sub-national IPAs performing targeted investment promotion towards specific sectors have a positive impact on the inflow of FDI. Regional IPAs are local organisations closer to the investor and its surrounding environment, and this proximity makes it possible for them to effectively influence investment operative conditions. The capacity of regional IPAs to influence FDI inflows by removing investors' operational bottlenecks is confirmed by the concentration of their impact in less developed regions, where information asymmetries and institution failures are more widespread. This finding suggests that, in attracting FDI towards less developed areas, sub-national IPAs act as a compensation

for malfunctioning institutions and inadequate information diffusion mechanisms. When looking across sectors within less developed regions, the impact is concentrated in knowledge-intensive sectors where collaborative systemic conditions are more relevant to the success of the investment. As information asymmetries are unlikely to vary across sectors within the same local economy, this finding may suggest that the capacity to create a supportive environment on the ground is complementary to the capacity to address information asymmetries highlighted by the existent literature on IPAs.

The novel results produced in this paper have relevant implications for public policy, in particular given the increasing attention of policy makers for the attraction of global capital flows. IPAs are viable tools to attract FDI even in advanced economies. However, investment promotion is a multi-layered architecture that involves both national and sub-national organisations. In advanced economies with integrated capital markets, sub-national regional IPAs play *ceteris paribus* a key role in FDI attraction. Investment promotion policies should be focused around the organisational layer closer to the actual investment and its environment in order to remove the operational barriers to the activity of foreign investors where they emerge.

The remainder of the paper is structured as follows. Section 2 discusses the role and rationale for investment promotion through IPAs, section 3 describes our unique dataset, section 4 discusses the empirical methodology, section 5 presents the results and section 6 concludes.

2. FDI promotion: rationale and impacts

The main motives behind FDI activities of multinational corporations (MNCs) are the search of resources not available in the home economy (resource seeking), the exploitation of new and larger markets (market seeking), the search for more efficient production modes (efficiency seeking) and of new and different technological capabilities (strategic asset seeking) (Dunning, 1996). Alongside these determinants of investment choices, another key element involves the business facilitation activity of the receiving environment (UNCTAD, 1998; Lim, 2008), including the definition of direct and indirect policies specifically aiming at the attraction of FDI (Loree and Guisinger, 1995). Among these policies, one of the most prominent and widespread tool is the establishment of IPAs (OECD, 2015; WWG, 2017).

The rationale for IPAs stems from the existence of information asymmetries and transaction costs in capital markets (Williamson, 1975, 1985). In presence of information imperfections, private capital may be sub-optimally allocated across space, justifying government intervention to address this market failure (Greenwald and Stiglitz, 1986). As foreign investors experience substantial informational

disadvantage relative to indigenous investors, IPAs support MNCs by facilitating their access to investment opportunities. IPAs are expected to play a key role in influencing FDI decisions by solving information/perception gaps about their host economy (Loewendhal, 2001; Lim, 2008) and reducing foreign firms' entry costs in new markets. Crucially, the provision of information makes reference not only to the structural conditions of the host economy – such as the number of active firms being potential competitors or suppliers – but also to the way in which investment conditions may improve over time. This improvement may reflect, for instance, information on planning or regulatory decisions by the relevant domestic public bodies that might be costly to collect and process.

Over and above the reduction of information asymmetries that might facilitate the selection of the best investment destinations, IPAs may also actively contribute to the development of a favourable ecosystem to the benefit of foreign investors. Their activities in this area are expected to cut operational and search costs of foreign companies (for example when dealing with domestic suppliers or in university-industry linkages) reducing transaction costs in the interaction with the host economy at all stages of the investment life-cycle. In addition, IPAs may directly or indirectly contribute to shape the national or local regulatory framework in response to investor's demand. As an example, agencies may lobby for the development of new infrastructure projects or for the design of specific training programme to match their need for specialist skills (Wells & Wint, 2001).

Both IPAs' functions – addressing information asymmetries and improving the overall investment environment – ensure that the distribution of inward FDI across space is governed by the production decisions of firms and the potential of host economies rather than by information asymmetries, search and transaction costs. The objective of IPAs in pursuing both functions is ultimately the generation of positive effects for the domestic economy through direct channels – linked with the operation of the investment itself – and indirect effects through spillovers.

In executing their functions, IPAs pursue four types of activities: (1) investor servicing, i.e. helping investors solve practical problems, including bureaucratic difficulties; (2) policy advocacy, i.e. lobbying governments to seek approvals of regulations or removals of obstacles for investments; (3) image building, i.e. advertising the locations in which they operate as investment destinations; (4) investment generation, i.e. actively seeking out investors based on the development plans designed by governments (Wells and Wint, 2001; OECD, 2011; WWG, 2017). According to Morisset and Andrew-Johnson (2004), investment generation tends to absorb the largest share of financial resources of IPAs. Investment generation is usually pursued by targeting a limited and pre-selected set of priority sectors, rather than through the horizontal undifferentiated attraction of investment in all sectors (Sirr et al., 2012). This facilitates the role of the agency's practitioners, who can attend only specific events related to the industries the IPA aims to attract. This type of targeted strategy is supposed to send a stronger,

more tailored and more powerful signal to a narrower more specialised audience (Harding and Javorcik, 2011).

In spite of the diffusion of investment promotion agencies as a policy to attract FDI, empirical studies examining the effects of the promotional effort of IPAs are far and few between. The first study examining the effort of public investment agencies in conditioning investment decisions was produced by Head et al. (1999), estimating a location choice model on a sample of Japanese manufacturing firms and showing that investment agencies have no statistical effect on the inflow of FDI from Japan to the US. More recent analyses have reported a positive role of IPAs in their effort of investment attraction. Morisset and Andrew-Johnson (2004) find a positive association between the budget and staff size of IPAs and the proportion of foreign investments towards the country where IPAs are based, while Lim (2008) shows that the age and the number of staff (domestically and overseas) of investment agencies contribute to attract foreign capital. Bobonis and Shatz (2007) and Anderson and Sutherland (2015) suggest that the active presence of IPAs in foreign countries can stimulate investment from the partner countries towards the IPA's domestic economy.

A related stream of empirical research has attempted to capture the causal impact of investment promotion on the growth of inward investment with country-level data. Charlton and Davis (2007) adopt propensity score matching in combination with difference-in-differences techniques. They find evidence of a positive effect of IPAs on the volume of investments towards specific industries targeted by the agencies in each country. A similar approach is employed by Harding and Javorcik (2011), developing difference-in-differences models to assess the impact of national IPAs on FDI inflows in targeted sectors, and comparing investment flows in each sector before and after a targeting strategy is implemented. Their results reveal that IPAs' activities are most effective in developing economies, characterised by severe information asymmetries and red tapes. Follow-up works show that FDI attracted by investment agencies contribute to the export upgrading of the host economies (Harding and Javorcik, 2012), and that IPAs' effectiveness increases with their quality, measured in terms of clarity of their website and competence of their staff (Harden and Javorcik, 2013).

3. Data and descriptive statistics

Our analysis focuses on Europe, a context in which investment promotion agencies represent a widespread policy to attract FDI. Despite the diversity in terms of economic conditions across the European continent, focusing on this context entails minimising heterogeneity in terms of how IPAs operate, as compared to cross-countries studies focusing on the entire world. The information on European IPAs which we use in our analysis comes from a new database, constructed as part of the

project on Multinationals, Innovation and Institutions in Europe (MASSIVE) financed by the European Research Council (ERC). Specific surveys have been sent in 2018 to investment promotion agencies active at the national and at the regional level across Europe, in order to collect information on their key characteristics[1]. The questionnaires include questions on the IPAs' history, sectorial strategies, public/private status, and modus operandi. After the surveys had been sent by email, follow-up emails and phone calls were made to increase the response rate and to check the consistency of the information received.

In this way, we have collected data on the *national* IPAs of 22 EU Member States[2] and from the following non-EU European countries: Albania, Norway, and Turkey. Such extended coverage allows us to study the phenomena across regions belonging to countries with different status (EU-15 Member States, EU Enlargement Member States, EU Candidates and EU Neighbours), geography (e.g. Eastern/Western Europe; Mediterranean/Continental countries) and different models of investment/industrial/productive structures (e.g. in terms of openness to trade).

Furthermore, the dataset includes information on *regional* (i.e. sub-national) IPAs from the following countries: Belgium, Germany, Greece, Italy, Ireland, Spain, Poland and Sweden[3]. This selection accounts for different models of national-regional IPA organization: Belgium is the only EU Member State with no national IPA and regional IPAs active in each region; Greece and Ireland have national IPAs but no regional IPAs; in Italy only some regions have their own IPAs; in Sweden sub-national IPAs cover different types of geographies, some being responsible for large territories such as regions, while some only focus on individual cities; finally, in Spain, Germany and Poland all administrative regions have their own IPA. In the Polish case, regional IPAs have been established simultaneously in 2011 thanks to the financial support of the European Cohesion Policy[4].

[1] Two types of surveys have been sent, depending on whether the IPA is national or sub-national. However, the structure of the surveys is relatively similar, allowing to obtain comparable information.

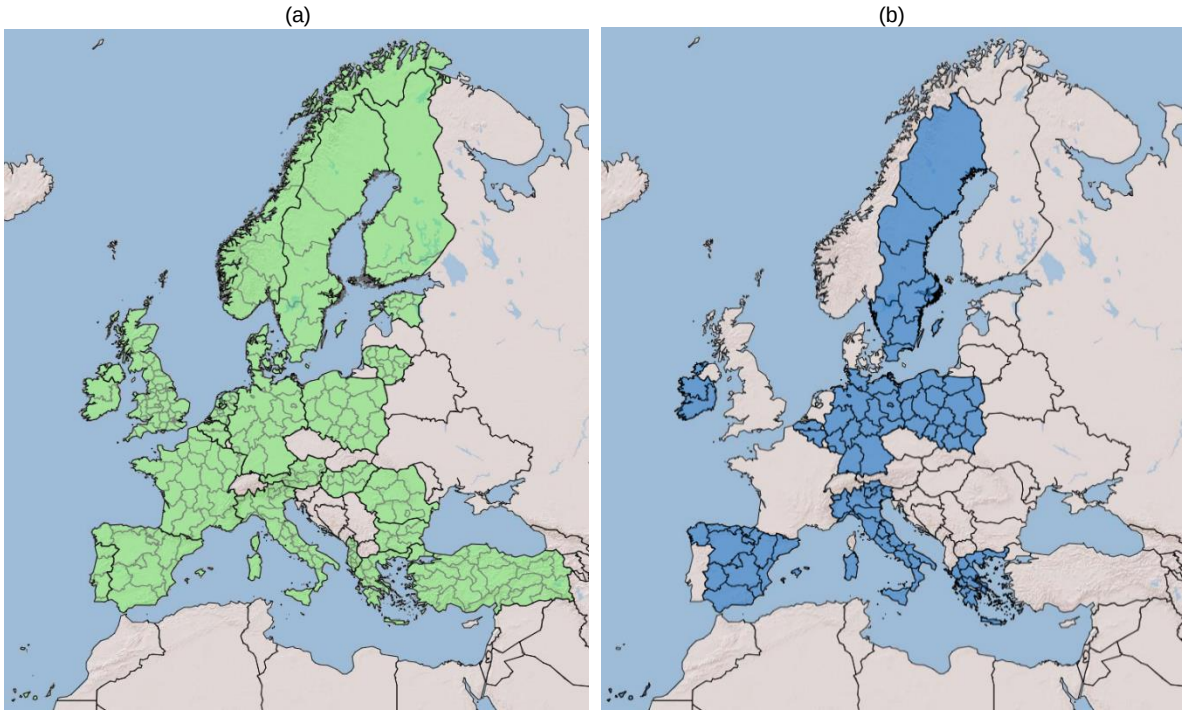
[2] We did not obtain information on national IPAs from the remaining EU Member States, namely Croatia, Czech Republic, Latvia, Luxembourg, Slovenia, and Slovakia.

[3] Rather than considering all regions from all European countries, we have chosen to focus our sub-national analysis on a restricted sample of countries, which appear relevant and heterogeneous in terms of their investment promotion models. This choice minimises self-selection of regions into the sample due to differences in the survey response rates. In other words, we have preferred to collect regional information from a restricted number of countries, in order to better concentrate data collection efforts and obtain information for the totality of their regions.

[4] EU Cohesion Policy consists in the largest public investment programme for economic development promotion in Europe. All regions across Europe are entitled to receive some form of financial support. The funds are made available depending on the level of economic disadvantage (https://ec.europa.eu/regional_policy/index.cfm/en/).

Figure 1 reports the two samples of regions considered for the analysis: panel (a) displays the regions of the 25 countries covered by the national IPAs survey, while panel (b) illustrates those included in the regional IPAs analysis[5].

Figure 1 – Sample of National (a) and Regional (b) IPAs.



Source: LSE-ERC Multinationals, Innovation and Institutions in Europe (MASSIVE) IPAs Survey.

Very often, IPA strategies for FDI attraction involve the selection of priority sectors for targeting. A key section of our questionnaires relates to gathering information on these priority sectors, by asking IPAs whether such targeting approach is in place, and if so, what the 'starting' and 'ending' date of sector targeting are[6]. In such a way, we constructed the full timing of IPAs' strategies.

[5] The information is in all-but-8 cases based on the questionnaire we have sent to regional IPAs. Five regions of Germany (Berlin, Branderburg, Saarland, Schleswig-Holstein, Saxony-Anhalt) and three regions of Spain (Extremadura, Cantabria, Rioja) have decided not to complete the survey. In these cases, information on year of establishment and targeted sectors has been retrieved from the agencies' website, when available. When the only available data is on the establishment date, the region appears as missing value in our database from the date of its establishment.

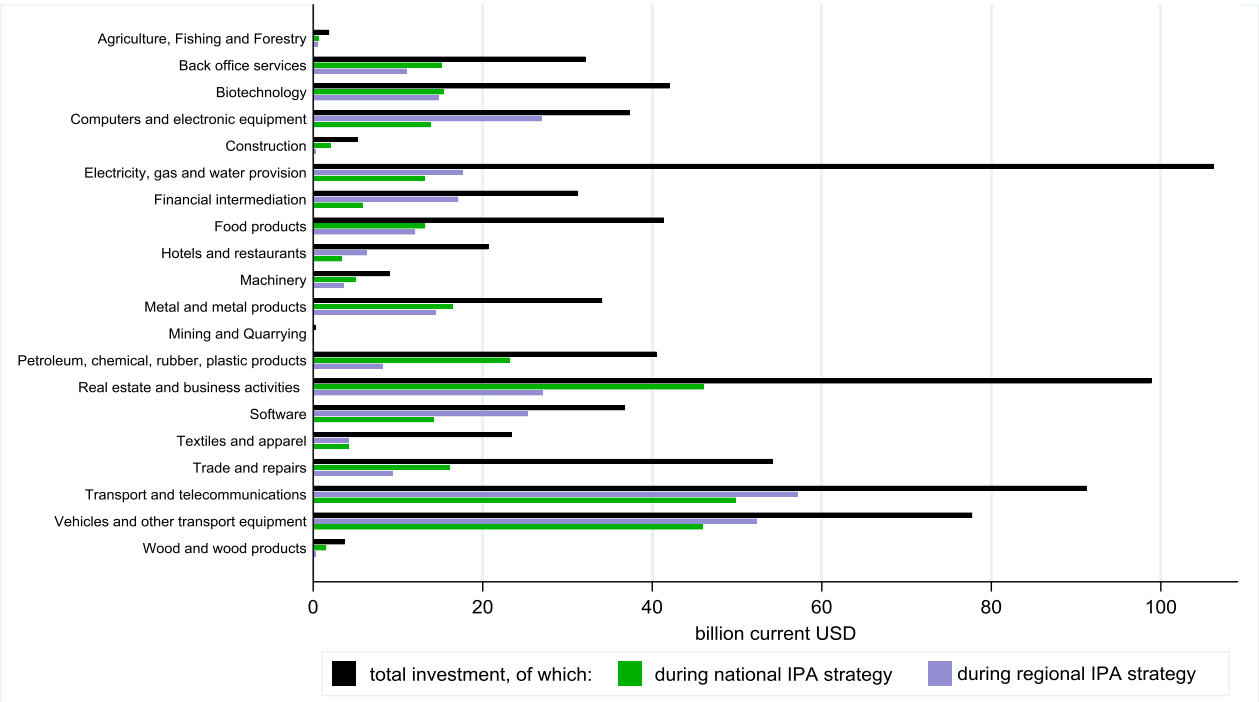
[6] We identify the following 20 sectors: Agriculture, Fishing and Forestry; Back office services; Biotechnology; Computers and electronic equipment; Construction; Electricity, gas and water provision; Financial intermediation; Food products; Hotels and restaurants; Machinery; Metal and metal products; Mining and Quarrying; Petroleum, chemical, rubber, plastic products; Real estate and business activities; Software; Textiles and apparel; Trade and repairs; Transport and telecommunications; Vehicles and other transport equipment; Wood and wood products.

Our final dataset combines data on IPAs collected with our survey with data on foreign direct investment at the level of region-sector-year. The latter comes from the fDI Markets database of the Financial Times. This collects unique information on FDI deals for all countries in the world, providing detailed statistics on time, sector, location of investment, as well as region of origin of investors and estimates on the investment value and jobs created over the 2003-2017 period.

Figures 3 and A1 in the Appendix show the total dollar value of foreign investment received and total years of IPA targeting by sector, for the sample of regions for which information on both national and regional IPAs is available. It can be noted that for some sectors regional IPAs strategies are associated with higher investment inflows than national IPAs, which may be due to the fact that in some cases regional strategies targeting specific sectors have been initiated prior to the corresponding national targeting.

Descriptive statistics of all variables used are reported in Table A1 in the Appendix.

Figure 3 – Inward Foreign Investment by sector and IPA type, 2003-2017



Note: sample of regions for which information on both national and regional IPA has been obtained. Source: own elaboration with fDI Markets data and LSE-ERC MASSIVE Survey of IPAs.

4. Methodology and empirical model

4.1 Difference-in-differences model

Our empirical strategy, inspired by Harding and Javorcik (2011), relies on a difference-in-differences model exploiting information on IPAs' targeting strategies by sector in European regions. Hence, the units of observation are measured at the 'region-sector-year' level. The sample is composed of NUTS2 (Nomenclature of territorial units for statistics – NUTS)[7] and NUTS1 regions, whereby the NUTS level for each country is chosen on the basis of the most meaningful subdivision reflective of administrative entities in a country[8]. Having identified the key targeted sectors selected by national and regional investment agencies for their investment attraction strategies, we assess the effects of Investment Promotion Agencies (IPAs) by estimating the additional FDI inflows in selected region-sectors during periods of activities of national and/or regional investment promotion agencies, relative to periods in which the agencies are not in operation and non-targeted region-sectors. This identification strategy allows to determine whether agencies are capable of attracting the type of investments they seek. The analysis is performed for the 2003-2017 period.

The baseline estimated model is:

$$FDI_{r,c,s,t} = \beta\ IPA\ strategy_{r,c,s,t} + \vartheta_{r,t} + \vartheta_{s,t} + \vartheta_{r,s} + \vartheta_{c,s,t} + \varepsilon_{r,c,s,t} \quad (1)$$

Where:

$FDI_{r,c,s,t}$ is a set of outcome variables measuring the impact of IPA strategies on FDI inflows at the extensive and intensive margin. The intensive margin effect, estimated with a linear probability model, is captured with a dummy variable taking value 1 if region *r* of country *c* has received any FDI in sector *s* in year *t*. The extensive margin effect, instead, is captured with the log[9] of the sum of million dollars

[7] https://ec.europa.eu/eurostat/web/nuts/background

[8] In particular, regions in the sample have been selected across the different NUTS level (1-2-3) in order to guarantee across countries comparability in terms of regions' role and representativeness: e.g., German Lander (NUTS1) are comparable to the Italian Administrative Regions (NUTS2) and the Lithuanian Counties (NUTS3).

[9] More specifically, , we adopt an equivalent of taking log i.e. the Inverse Hyperbolic Sine (IHS) transformation. This is based on the following formula: $y_{r,s,t} = \ln((FDI_{r,s,t} + \sqrt{1 + FDI_{r,s,t}^2})/2)$. This technique is commonly used as an alternative for log-transformations of variables with 'zero' entries (Burbidge et al., 1988) In our case, it allows to include in the estimation the high number of zero values in the FDI variable that would be missed if the log transformation was applied.

of FDI in region *r* of country *c* in sector *s* in year *t*, or with the log transformation of the amount of jobs directly created by the new FDI project.

$IPA\ strategy_{r,s,t}$ is a dummy variable that refers to the targeting of sector *s* in year *t* by an investment promotion agency. The agency can either be national or regional. In the case of a national agency, the dummy switches on from the moment the sector-targeting begins until it ends for all the regions belonging to the country in which the national IPA operates. In the case of a regional agency, the dummy takes value 1 from the year in which the targeting of a sector begins until it comes to an end in that specific region.

$\vartheta_{r,s}$, $\vartheta_{r,t}$, $\vartheta_{s,t}$ are region-sector, region-time, and sector-time fixed effects, respectively, dealing with unobserved time-invariant characteristics specific to region-sector combinations and with region- and sector-specific annual shocks; $\vartheta_{c,s,t}$ are country-sector-year specific dummies, which complete our model when we estimate the impact of regional IPAs only.

$\varepsilon_{c,r,s,t}$ are idiosyncratic error terms. Standard errors are clustered at the region-sector level.

As an alternative specification, the model is estimated as a dynamic panel, where the dependent variable enters as first difference ($\Delta\, FDI_{r,c,s,t} = FDI_{r,c,s,t} - FDI_{r,c,s,t-1}$), while $FDI_{r,c,s,t-1}$ represents the lagged level of FDI, accounting for the FDI received by region *r* in sector *s* one year earlier.

The model is as follows:

$$\Delta\, FDI_{r,c,s,t} = \alpha\, FDI_{r,c,s,t-1} + \beta\, IPA\ strategy_{r,c,s,t} + \vartheta_{r,t} + \vartheta_{s,t} + \vartheta_{r,s} + \vartheta_{c,s,t} + \varepsilon_{r,c,s,t} \qquad (2)$$

This version of the model allows to further control for the FDI-attracting capacity of region-sectors in the period before the treatment kicks in.

4.2 Estimation issues

The main empirical challenge of our study is the endogeneity of the FDI policy. The selection of specific sectors by IPAs is a non-random decision that may be taken strategically on the basis of pre-existing conditions. Some industries may already be recipient of high inflows of FDI before the IPAs are established and, by targeting these sectors, regions may aim to further reinforce their comparative advantage. Alternatively, it may be that some new industries, not yet recipient of foreign investments, are targeted by IPAs because they appear to offer better future prospects for a region. In the former case, a positive estimated impact of IPA targeting on FDI inflows may be simply the consequence of

the initial competitiveness of the region in the given sector. In the latter case, a link between IPAs' strategies and foreign investments may be the result of pre-determined regional conditions influencing future regional performance.

To deal with this issue, we include in the model region-sector fixed effects, controlling for any unobservable time-invariant characteristics specific to region-sectors and accounting for the comparative advantage of regions in each sector.

A related econometric challenge consists in distinguishing between the role of IPA policies from other policies and incentives being promoted in coincidence with the activity of investment agencies. Region-year fixed effects are included in the model in order to minimise this problem. If policy tools unrelated to IPA are put in place to incentivise foreign investment in a region or a country, the effect of these government efforts are controlled for by the region-year fixed effects, so long as policies may affect all sectors of investments of a region and are not targeting the same set of sectors targeted by the IPAs in the same period of time. Moreover, sector-time fixed effects allow to capture sector-specific shocks in each year, occurring if international investors suddenly begin to concentrate investments in one or more sectors. Finally, country-year fixed effects account for anything varying at the national level. Clearly, these are collinear to the treatment dummy capturing national IPA strategies, hence this set of fixed effects can only be included to estimate the impact of regional, not national, IPAs.

In some cases, IPA targeting strategies terminate prior to the end of our sample period. While this is a rare condition, as the large majority of strategies are still ongoing in 2017, we need to account for the fact that these post-treatment years may be contaminated by the treatment. To avoid this kind of concern, all our specifications exclude post-treatment years from sample.

To further control for pre-treatment differences in FDI inflows, we estimate our baseline model also as a dynamic panel, controlling for the lagged level of FDI in region-sectors. We further test for the direction of causality and for the parallel trend assumption with an event study, including controls for region-sector-specific time trends. This exercise allows to verify the difference between treatment and control region-sector year-by-year before and during the treatment, shedding light on the temporal dynamics of the estimated effect.

In addition, as an alternative strategy to address endogeneity, we construct counterfactual region-sectors that behave in the same way as treated ones in the pre-treatment period, forcing the parallel trend assumption to be met. We do so by means of the synthetic control method (Abadie and Gardeazabal, 2003; Abadie et al. 2014). This strategy is explained in more details in the following section.

4.3 Synthetic controls

The synthetic control method, proposed by Abadie and Gardeazabal (2003) and Abadie et al. (2010; 2015), allows us to construct counterfactuals for treated region-sectors such that the treatment and control region-sectors follow the same trend before the sector-targeting strategy kicks in. This technique exploits a set of covariates measured in the pre-intervention period to build artificial region-sectors following similar pre-trends of those implementing IPA targeting strategies. Any difference in the evolution of the dependent variable during the pre-treatment is forcibly minimised, thus ensuring that the parallel trend assumption is met. In this way, any bias due to the high spatial dependence of sub-national units is largely accounted for (Gobillon and Magnac, 2016).

The synthetic control analysis is performed for the sample of regions for which we have information on the presence and targeting strategy of both national and regional agencies, namely: Belgium, Germany, Greece, Ireland, Italy, Poland, Spain, and Sweden. This allows us to define treatment region-sectors and their donor pools. In other words, treated region-sectors are those in which a targeting has begun at some point in time, while the national agency of that country (if it exists) is never targeting the same sector. In addition, we focus exclusively on strategies targeting selected sectors, thus excluding regions whose agencies are not selective in terms of sectors to target with their strategies.

In order to facilitate the successful pre-treatment matching between artificial control and treatment units and produce the synthetic control analysis, we convert our FDI dependent variable from a flow into a stock, by constructing the cumulative sum of FDI into each region-sector from the beginning until the end of the analysed period. Synthetic controls are constructed on the basis of a set of variables traditionally identified as FDI determinants, most of which are measured at the regional level. They are: log per capita GDP, share of tertiary educated individuals, unemployment rate, log population, log population density and log patent applications per million inhabitants[10]. We also adopt as matching covariates the dependent variable measured both as a stock (log cumulative FDI) and as a flow (log FDI), as customary in this methodological approach (Abadie et al., 2010; 2015), as well as the number of FDI jobs created and the FDI dummy taking value 1 if at least one investment has been made in a region-sector in a given year. A summary of pre-intervention covariates for the synthetic control analysis, for both treated and donor region-sectors, is reported in Table 1. The table shows the average value for all variables for the entire period of both treated and donor region-sectors, as well as pre-treatment values for region-sectors beginning a targeting strategy at any point during the sample period.

[10] For each variable, we only consider the pre-treatment period for which information is available. While this varies, in almost all cases the entire pre-treatment is covered for all covariates. If, for instance, for some regions data on patent applications is only available from 2007, then the variable does not enter as a covariate for those region-sectors before 2007.

Different from traditional studies adopting the synthetic control method on single treated units (e.g. Abadie and Gardeazabal, 2003; Abadie et al. 2010), we have a large number of treated observations, i.e. region-sectors beginning an IPA targeting strategy. In such a context, Gobillon and Magnac (2016) and Kreif et al. (2016) perform the analysis by producing repeated estimations and then aggregating the result over the various synthetic controls to yield the average treatment on the treated. We follow this empirical approach in our study.

In addition, our setting entails that the treatment (sector targeting) may begin at any point in time. Hence, we replicate the synthetic control analysis for each and every unit and year of data beginning from 2005 – in order to have at least two pre-treatment periods – and ending in 2016 – in order to have at least one treatment period. The donor pool providing weights for the synthetic control of each region-sector beginning a targeting strategy is composed of regions that either do not have an agency, or, if they do, this agency is never targeting the sector in which the IPA targeting activity of the treated unit will begin. By definition, this procedure excludes from the treatment and donor groups any region-sector whose targeting begins before the start of the sample period. Hence, for each treated region and sector, the synthetic control is obtained from all regions without a regional IPA operating in the same sector, on the basis of all the pre-treatment observations. The number of treated region-sectors by year are reported in Tables A9 and A10 in the Appendix.

Table 1 – Descriptive statistics, treated and donor region-sectors

Variable	Treated region-sectors				Donor pool region-sectors	
	2003-2017		Pre-treatment years		2003-2017	
	Obs	Mean	Obs	Mean	Obs	Mean
Log FDI (cumulative stock)	5250	4.10	1597	2.93	18,750	2.60
Log FDI (flow)	5250	1.78	1597	1.34	18,750	0.90
Log FDI-related jobs	5250	2.25	1597	1.72	18,750	1.14
FDI dummy	5250	0.42	1597	0.32	18,750	0.22
log GDP pc	4900	10.06	1578	10.02	17,500	9.99
Tertiary educated	5198	0.25	1571	0.21	18,722	0.24
Unemployment rate	5198	10.61	1571	10.13	18,682	12.17
Log population	5250	14.64	1597	14.59	18,750	14.14
Log population density	4848	4.97	1526	4.65	17,472	4.75
Log patent applications	3487	3.88	1347	3.83	11,713	3.40

5. Results

5.1 Baseline results

The results of the difference-in-differences estimates of the impact of IPAs' strategies on FDI inflows are presented in Table 2. We estimate the intensive margin effect of a national/regional agency beginning an FDI-targeting strategy in columns (1)-(4) (dummy variable taking value 1 if there is an investment inflow in the region-sector), while the extensive margin effect (dollar value of the investment) is estimated in columns (5)-(8). The same model with FDI-jobs as dependent variable is reported in Table A2 in the Appendix. The baseline model initially estimates the effect of national IPA strategies or regional IPA strategies separately, including first the national and then the regional IPA treatment dummies in the model. Finally, they are both simultaneously included. All models include region-year, sector-year, and region-sector fixed effects. Estimates in columns (3) and (6) include country-sector-year fixed effects.

We begin discussing the findings on the effect of national IPAs. Column (1) and column (5) of Table 2 report an insignificant coefficient of national IPA strategies at the intensive or extensive margin, suggesting the lack of impact of national IPA targeting on FDI inflows towards region-sectors of targeted countries. Similarly, there is no relationship between the activity of national IPAs and the amount of FDI jobs created in a region-sector (Table A2 in the Appendix, column (1)).

Turning to the effect of regional IPA strategies, FDI inflows towards targeted region-sectors are higher than in control region-sectors. The probability to receive FDI towards the sector(s) selected for targeting by a region increases by about 4 percent after the beginning of a strategy, as indicated by the positive and significant coefficient of the treatment dummy in column (2). This coefficient remains remarkably stable when controlling for any element varying at the national level with country-sector-year fixed effects in column (3). The result holds also when both treatment dummies are simultaneously included in the model in column (4).

Regional IPAs' strategies are effective in attracting FDI, and the amount of attracted foreign capital appears substantial. Columns (6)-(8), estimating the extensive margin effect, report a sizable impact. The magnitude of the coefficient, although lower than the one reported in previous studies on national IPAs (Charlton & Davis, 2007; Harding and Javorcik, 2011), indicates that the activity and targeting effort of a regional investment agency leads to an increase of around 23% in the inflow of FDI (column (8), Table 2). Table A2 in the Appendix shows that FDI-related jobs increase by up to 24% as a result of IPA targeting strategies. Considering an average dollar value of 28 million in FDI inflows in the region-sectors in sample, and an average of 85 jobs created, the estimated effect corresponds to an

increase of 6 million dollars and 20 jobs per year in each region-sector. When combining together national and regional IPA treatment dummies in the same specifications, these results are confirmed (Table 2, columns (4) and (8))[11].

Therefore, sectors targeted by regional IPAs perform significantly better than non-targeted sectors in terms of FDI attraction, as investment agencies appear to be effective in their effort of attracting foreign capital in the sectors they identify as the most suitable for the development of the region. The strong effect of regional IPA targeting strategies on FDI inflows is confirmed also when estimating the model as a dynamic panel (equation (2)). The results are reported in Table A3 in the Appendix: in this case coefficients are slightly higher than in Table 2, indicating a 5 percent average annual increase in the probability of FDI inflows after the beginning of targeting, while the increase in FDI in million dollars and jobs created corresponds to up to 24 percent and 25 percent, respectively.

Table 2 – Baseline results (full sample)

	FDI dummy				million $ FDI			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
National IPA strategy	0.0105 (0.00912)			-0.0141 (0.0150)	0.0358 (0.0404)			-0.0588 (0.0679)
Regional IPA strategy		0.0392* (0.0221)	0.0383* (0.0224)	0.0401* (0.0222)		0.201** (0.0930)	0.201** (0.0942)	0.204** (0.0931)
Country-sector-year dummies			✓				✓	
Region-year dummies	✓	✓	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓	✓	✓
Observations	74,923	27,441	27,441	27,441	74,923	27,441	27,441	27,441
Region-sectors	5000	1920	1920	1920	5000	1920	1920	1920
R-squared	0.533	0.546	0.592	0.546	0.577	0.584	0.630	0.590

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: dummy variable for inward FDI towards region-sector in given year (columns (1)-(3)), log million $ inward FDI towards region-sector in given year (columns (4)-(6). 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Years after the end of targeting strategies excluded from sample.

The inclusion in all our models of region-year fixed effects entails that the exploited variability is given by national agencies whose targeting strategy varies across sectors. In other words, all national and

[11] A negative and mildly significant coefficient of national IPA strategies emerges when using FDI-related jobs as dependent variable (Table A2, column (4)), suggesting that national targeting activities may have a harmful average impact at the sub-national level. This result, however, must be taken *cum grano salis* because it can be computed only for the restricted sample of regions for which we have collected information on regional IPA strategies.

regional agencies that, when created, do not adopt any sectoral preference for FDI attraction are not accounted for in the estimates of Table 2, A2, and A3. Hence, the coefficients estimating the positive impact of regional IPAs should be interpreted as the annual variation in regional FDI inflow towards the sectors that regional agencies have identified as key for their regions, after the targeting strategy has begun. One important question is whether strategies that do not identify any priority sectors for targeting (thus attracting FDI 'horizontally' towards all sectors) are equally successful.

In order to test whether the effect of regional IPAs is exclusively driven by sector-targeting strategies, or whether 'horizontal' strategies are also effective, in Table A4 we present the results of a model including different treatment dummy variables identifying whether the agency specifically selects some key sectors for targeting inward FDI, or whether the agency does not prioritise any particular sector and targets FDI in all sectors[12]. In the latter case, the treatment dummy switches on for all sectors from the moment in which the agency has been created. Hence, we had to exclude region-year fixed effects. The results in Table A4 indicate that the mere creation of an agency is insufficient to increase the capacity to attract FDI. In order to be successful, the agency has to select some sectors and aim for higher FDI towards those sectors.

Given that regional IPAs appear to be generally effective in their effort of attracting foreign capital, we further investigate the nature of this effect by verifying that impact does materialise where the functions pursued by IPAs are expected to matter the most, i.e. where both information asymmetries and investment conditions are more challenging. For this purpose, we sub-divide our sample of regions between 'advanced' and 'less developed', following the classification adopted by the European Union for the allocation of EU Structural Funds[13]. This classification makes it possible to identify the regions that have been lagging behind in terms of economic performance and that are more structurally disadvantaged. Less developed regions are generally less open to external competition (Baldwin and Venables 1995), have lower levels of generalised trust (Guiso et al., 2004) and weaker institutional and systemic conditions (Tabellini, 2010; Charron and Lapuente, 2013). As a consequence, if regional IPAs are impactful because they pursue their functions effectively, their impact should be stronger in less developed regions where they are needed the most. As shown in Figure A2, this sub-division splits our sample identifying 37 regions classified as 'less developed' and 59 'advanced' regions.

[12] One of the questions of our questionnaire explicitly asked regions whether they had a targeting strategy on some sectors or not. The treatment variable for non-targeting strategies takes value 1 from the moment an agency is created in all sectors of a region if the regional IPA has declared that it does not operate sector-targeting. 16 regions of our sample have declared to have no such targeting strategy.

[13] The EU categorises 'less developed regions' according to their income relative to the EU average. Regions with a GDP per capita below the 75% of the EU average are assigned this status. In our study, we adopt the sub-division established in 2000 for the 2000-2006 EU budget period.

The results of the difference-in-differences analysis, reproducing the estimation of equations (1) and (2) with these split samples, are reported in Table 3 and Tables A5 and A6 in the Appendix. We again test the impact of IPAs on FDI attraction at the extensive and at the intensive margin, adopting a linear probability model and the FDI dummy dependent variable in the former case, and the log of FDI million dollars and jobs created as dependent variables in the latter case.

First, it can be noted that for no sub-sample we uncover a significant contribution of national agencies for FDI attraction. This confirms the results discussed in the previous section. Irrespective of the investment conditions, national IPAs have limited impact in terms of FDI attraction. Turning to regional agencies, as shown in Tables 3, A5, and A6, across all different specifications and models the analysis indicates that IPAs in less developed regions are highly effective, while the same is not true for advanced regions. IPAs in less developed regions increase the probability of attracting foreign capital by up to 14% (column (2), Table 3) on average, increase the inflow of investment by 71% (column (8), Table 3) and the number of jobs created by 102% (column (2), Table A5) on an annual basis. Considering that over the period under analysis each sector in less developed regions has received an average FDI inflow of 24 million dollars, and an average of 96 jobs have been created through FDI yearly, the estimated effect corresponds to an annual increase of 17 million dollars in greenfield FDI and 98 new jobs per year in each of the 20 targeted sectors, on top of what would have been received/created in the same region in absence of the agency.

This set of results suggests that investment promotion agencies make the difference for FDI attraction particularly in less developed regions. As FDI in less developed regions generally involves higher risks and uncertainty for investors, IPAs can reassure foreign companies over the receptiveness of the local environment to foreign investments and their expected returns. Therefore, closer proximity to the operative environment of foreign investors in host economies makes regional IPAs more effective in pursuing their functions, better addressing investors' needs. Given that investment promotion is only effective in more economically disadvantaged contexts, we can hypothesise that in these areas, generally less appealing to investors, IPAs contribute to make up for information asymmetries, institutional weakness and unfavourable systemic conditions.

Table 3 – Less developed / advanced regions

	FDI dummy						log million $ FDI					
Sample:	Less developed regions			Advanced regions			Less developed regions			Advanced regions		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
National IPA strategy			-0.0140			-0.0108			-0.0408			-0.0698
			(0.0334)			(0.0173)			(0.147)			(0.0788)
Regional IPA strategy	0.104**	0.139***	0.105**	0.0149	0.00517	0.0155	0.447**	0.535***	0.451**	0.104	0.0681	0.108
	(0.0453)	(0.0456)	(0.0456)	(0.0251)	(0.0258)	(0.0251)	(0.189)	(0.199)	(0.190)	(0.105)	(0.110)	(0.105)
Country-sector-year dummies		✓			✓			✓			✓	
Region-year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Observations	10,680	10,680	10,680	16,761	16,761	16,761	10,680	10,680	10,680	16,761	16,761	16,761
Region-sectors	740	740	740	1180	1180	1180	740	740	740	1180	1180	1180
R-squared	0.506	0.569	0.506	0.573	0.629	0.573	0.530	0.589	0.694	0.620	0.675	0.620

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Treatment dummy variables: 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country. 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Less developed regions: regions classified as 'Less developed' for EU funds allocation (GDP pc < 75% EU average). Advanced regions: regions not classified as 'Less developed' by the EU.

In order to shed further light on the mechanisms underlying the estimated effects, we dig deeper into impact heterogeneity. Given that existent data do not allow us to clearly disentangle the intensity of effort for each IPA function (all agencies formally pursue their functions with limited systematic tracking of time or budget allocations) we need to rely on more indirect clues. One way to study the type of IPA functions driving the results is to verify whether impacts vary across sectors within the same group of regions. It is unlikely that activities that primarily address information asymmetries (e.g. 'image building') would be systematically biased in favour of specific sectors, taking into account how diversified our sample is in terms of countries and regions. Therefore, if the impact is stronger in sectors where connectivity with the local business ecosystem is more important for the success of the investment – i.e. knowledge intensive sectors – we would find indirect evidence of the importance of functions enhancing the investment environment vis-à-vis more general informational/promotional functions.

To test for this, we sub-divide the twenty sectors of our survey on the basis of whether they are more or less knowledge-intensive. We produce this distinction by exploiting the definition of high-tech and low-tech industries and knowledge-intensive services provided by the European Commission for NACE sectors[14]. In this way, we aim to verify the nature of investment attracted by IPAs towards their area of competence. The results, reported in Tables A7 and A8, confirm that the estimated effectiveness of IPAs in less developed regions derives especially from the attraction of FDI in high knowledge intensive sectors. The coefficients of column (2), Table A7 indicate that IPAs increase the probability of FDI in these sectors by 21%, the FDI million dollar value is up to 176% higher (an increase of 38 million), and up to 260% more jobs are created (an increase of 231 jobs). IPAs, therefore, especially favour the attraction of more knowledge-intensive investment towards less developed regions, offering some support to the hypothesis that their impact is mostly driven by their capacity to enhance the quality of the investment economic environment.

5.2 Event study

In this section, we test for the direction of causality and demonstrate that the obtained finding is not driven by pre-existing trends in region-sectors. We perform an event study by verifying that treated and untreated region-sectors are similar and comparable in the pre-treatment period. In order to do this, we re-estimate our baseline model (both for the full sample and for the sub-sample of less developed regions) by including in the model a full set of leads and lags dummy variables referring to each year

[14] https://ec.europa.eu/eurostat/cache/metadata/en/htec_esms.htm. High-knowledge intensive sectors in our dataset are identified as follows: 'Biotechnology', 'Computers and electronic equipment', 'Software', 'Machinery', 'Transport and telecommunications', 'Vehicles and other transport equipment', 'Financial intermediation' are considered as knowledge intensive, while all remaining sectors are classified as less knowledge-intensive.

before the beginning of the targeting strategy and each year during the treatment. Additionally, we control for region-sector specific time trends. The model, which allows to observe the temporal dynamics of the treatment effect, is:

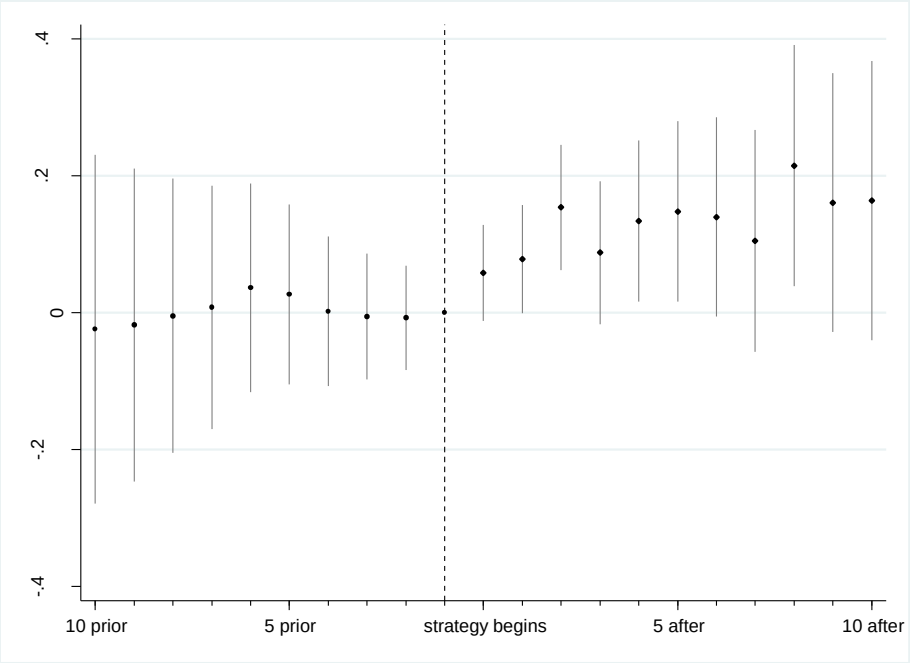
$$y_{r,c,s,t} = \beta\ IPA\ strategy_{r,c,s,t} + \sum_{\tau=2}^{q} \delta_{-\tau}\, D_{r,c,s,t-\tau} + \sum_{\tau=1}^{q} \delta_{+\tau}\, D_{r,c,s,t+\tau} + \vartheta_{r,t} + \vartheta_{s,t} + \vartheta_{r,s} + \vartheta_{c,s,t} + \varphi\ trend_{r,s,t} + \varepsilon_{r,c,s,t} \quad (3)$$

Where q leads dummy variables ($D_{r,s,t-2}$, $D_{r,s,t-3}$, …, $D_{r,s,t-q}$) and lags dummy variables ($D_{r,s,t+1}$, $D_{r,s,t+2}$, …, $D_{r,s,t+q}$) are included in the model to check for anticipatory effects in investment flows, that is, to test for a significant difference in terms of the outcome variable, the FDI dummy, for treatment and control region-sectors in the period immediately before the treatment begins (Angrist and Pischke, 2008). We include the full set of dummies for pre-treatment and treatment years (up to 15 years) with the exclusion of the first-year lag, used as reference category. $trend_{r,s,t}$ are region-sector-year trends. If, as hypothesised, IPA strategies are determining changes in the inflow of FDI, and not vice versa, we should expect the leads dummy variables to return insignificant coefficients.

The results of this test are shown in Figure 4 (full sample) and in Figure 5 (sub-sample of less developed regions), both displaying the coefficients of leads and lags with corresponding confidence intervals for each year up to 10 before and 10 after the beginning of regional strategies[15]. It can be noted that no pre-treatment coefficient is statistically significant, providing evidence that the rich set of fixed effects included in the model performs well in making sure that the parallel trend assumption holds. In the years before the beginning of a strategy, region-sectors about to be targeted by IPAs have the same probability of receiving FDI as untreated region-sectors. After the beginning of a regional IPA strategy, the probability of inward FDI increases significantly from the first year after a strategy has begun, remaining consistently higher for the following years. In other words, these tests confirm that the impact of regional IPAs is significant from the year in which targeting strategies are established, and long-lasting for several years.

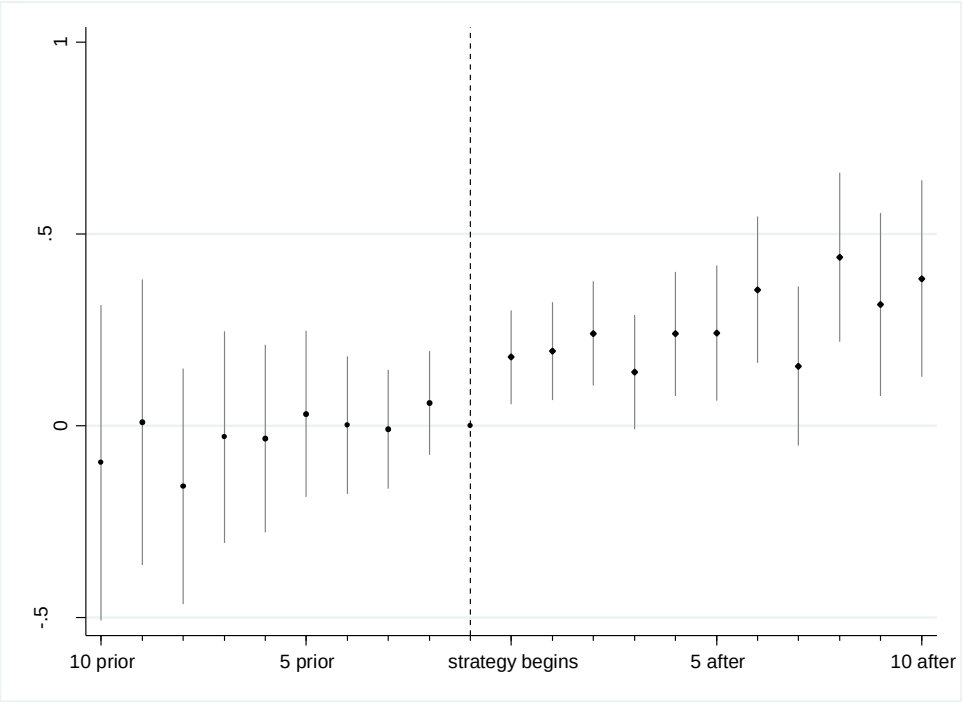
Figure 4 – Event study (full sample)

[15] The model is estimated with all pre/during treatment years included. This implies having 14 leads (for strategies beginning in 2017) and 14 lags (for strategies beginning in 2003). The Figure reports a lower number of coefficients because the simple size reduces as leads/lags increase, making long leads/lags' coefficients less reliable.



Event study using t-1 (1 year before targeting strategy) as reference category. Grey spikes refer to 90% confidence intervals. Black circles: estimated coefficients of pre-treatment lead dummy variables. Black diamons: estimated coefficients of lags dummy variables. Dependent variable: FDI dummy. Sector-year, region-year, region-sector, country-sector-year dummies and region-sector-year time trends included in the model. Years after the end of targeting strategies excluded from sample.

Figure 5 – Event study (less developed regions)



Event study using t-1 (1 year before targeting strategy) as reference category. Grey spikes refer to 90% confidence intervals. Black circles: estimated coefficients of pre-treatment lead dummy variables. Black diamons: estimated coefficients of lags dummy variables. Dependent variable: FDI dummy. Sector-year, region-year, region-sector,

country-sector-year dummies and region-sector-year time trends included in the model. Years after the end of targeting strategies excluded from sample.

5.3 Synthetic control estimates

This section corroborates the results obtained by constructing synthetic region-sectors mimicking the pre-treatment trends of all units implementing regional IPA sector-targeting strategies.

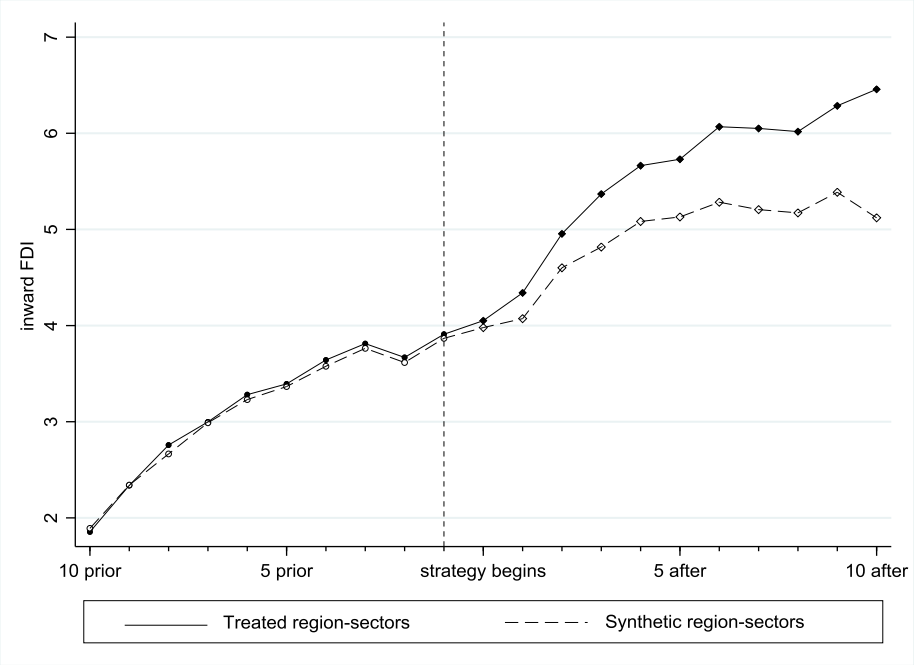
We begin by creating synthetic controls for each treated unit and every year. Next, we pool all results together to display the average trajectory of treated and synthetic region-sectors. Treated/synthetic control couples are trimmed in order to drop the top 5% of the Root Mean Square Prediction Error (RMSPE) distribution, ensuring the best possible pre-treatment match. The graphical representation of the trajectories of pooled treated and synthetic counterparts is shown in Figure 6. The two trends of treatment and synthetic region-sectors are constructed on the basis of the different point estimates by each period before/after the beginning of sector-targeting by each regional IPA[16].

Figure 6 indicates that, as all periods and pairs are pooled together, for all 10 years before the beginning of the strategy the two groups follow a very similar trajectory. Figure 7, displaying the gap between the treatment and synthetic control line, shows how the parallel trend assumption is satisfied, with very little difference between the two lines in the pre-treatment period. A clear difference between treatment and synthetic controls' trajectories is visible from the first year after the start of a regional strategy. As shown in Figure 7, this gap keeps growing over time, indicating that a higher proportion of FDI is flowing towards treated-region sectors, vis-à-vis untreated region-sectors, from the moment the strategy is initiated. This confirms the result obtained with the difference-in-differences model, reporting a positive effect of IPA regional strategies on inward FDI.[17]

[16] By definition, point estimates on the central period (t=0, i.e. around the moment in which the strategy begins) are obtained by pooling a larger number of treated-synthetic pairs of observations than for periods distant from the moment in which the treatment kicks in. To be precise, the moment of the start of a strategy is obtained from 138 treated region-sectors and their corresponding synthetic controls, as shown in Table A9 in the Appendix. The number of treated units reduces as we move away from the starting moment of a strategy. Given that for the synthetic control estimates we exclude units whose strategies begins earlier than 2005, and there are no treated units observed 13 or more years after the beginning of the treatment.

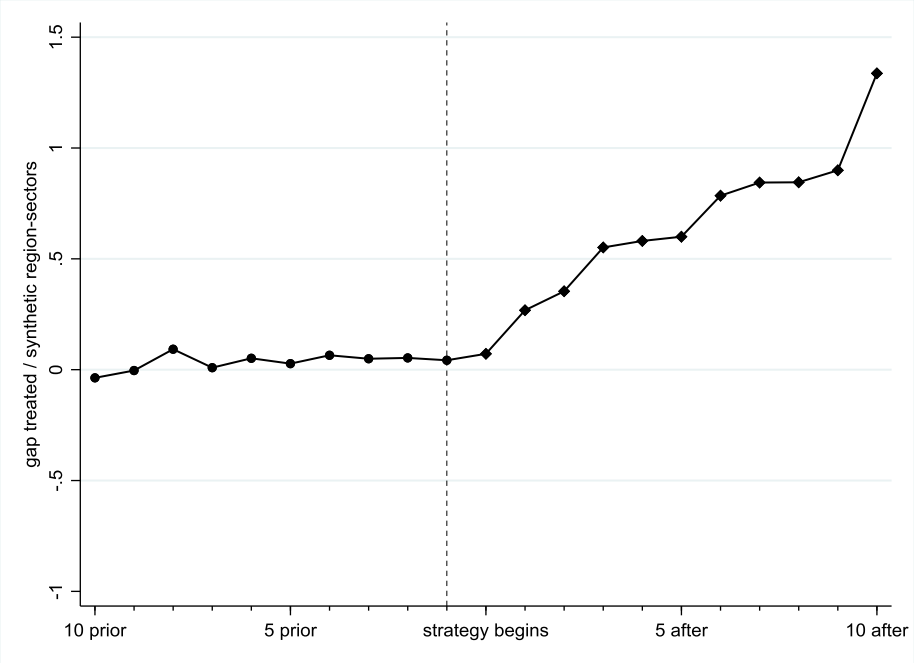
[17] Correspondent results for the sub-sample of less developed regions are reported in Table A6 of the Appendix. In this case, the number of treated region-sectors over time is much lower than in the full sample analysis, as can be noted from Table A10, and hence the estimated treated/synthetic control difference for periods far away from the beginning of the targeting strategies (e.g. t+10) is obtained with fewer observations and less statistically reliable. The gap between treated and synthetic controls units estimated for the sub-sample is even larger than the one estimated for the full sample.

Figure 6 – Synthetic control estimates, 2003-2017



Pooled treated/synthetic region-sectors by year before/during strategy. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Continuous line: treated region-sectors; dashed line: synthetic region-sectors. Circles: average pre-treatment values for treated (black) and synthetic (hollow) units by year pre-targeting. Diamonds: average treatment values for treated (black) and synthetic (hollow) units by year during targeting. The lower value of inward FDI in the year t-2 as compared with t-3 is due to the relatively high number of units whose treatment starts in the year 2005.

Figure 7 – gap treated/control region-sectors, 2003-2017



Gap between pooled treated region-sectors and synthetic controls. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Circles: average pre-treatment gap by year pre-targeting; Diamonds: average treatment gap by year during targeting.

Given the relatively unbalanced number of treated region-sectors by period of targeting, with more treated units starting their targeting in the last years of sample (Table A9), as a robustness test we re-construct treated vs. synthetic control trajectories and gaps using reduced sample periods. We split the 138 treated units almost equally by focusing on the 2005-2012 and the 2013-2017 periods. The results of this robustness test, displayed in Figure A3 and A4 in the Appendix, confirm the FDI gap between treated and synthetic region-sectors developing after the begin of targeting strategies, with regions having started a sector-targeting strategy receiving more FDI than counterfactual region-sectors.

By leveraging a specific test which is standard in the application of the synthetic control methods we are also able to test for potential confoundedness arising from neighbouring regions (spillovers): for this purpose we replicate the estimates for the full period 2003-2017 by excluding from the donor pool of each treated region-sectors the four closest/bordering regions. The results of this test are reported in Figure A5 in the Appendix. The estimated gap is very similar to the one displayed in Figure 7. If anything, excluding nearest neighbours makes the difference between treated and synthetic control-sectors slightly larger. Hence, this suggests that the estimated effect produced by FDI-attraction from regional IPAs is not driven by displaced FDI from neighbouring units.

6. Conclusions

IPAs are increasingly popular tools leveraged by national and sub-national governments to attract foreign capital in both advanced and emerging economies. However, the evidence base supporting this relevant (and expanding) area of public policy intervention remains rather limited. It has become apparent that major market failures, preventing the optimal allocation of capital, have emerged within (rather than between) countries both in advanced and emerging economies. The national-level focus of previous studies, together with the omission of sub-national investment promotion efforts, has so far masked relevant insights for public policies targeting global capital flows.

By leveraging granular sub-national FDI data in combination with an innovative data collection on the activities of regional IPAs, our analysis has uncovered significant new patterns. The focus on economies that are part of the same EU Single Market (with stringent constraints on tax incentives and anti-competitive behaviour) has made it possible to minimise the influence on FDI location decisions of

national-level factors other than IPA efforts. When looking within countries, these confounding factors become even less relevant.

Our results – obtained by means of state-of-the-art policy evaluation methods – unveil that regional attractiveness to FDI is not fostered by national IPAs but can respond to sub-national IPAs strategies. Sub-national IPAs contribute to increase inflows of foreign investment at the intensive margin – i.e. raising the probability to receive FDI – and at the extensive margin – boosting the amount of total foreign investment received as well as the jobs directly created by the investment. This impact is stronger in less developed regions, i.e. in sub-national economies where information asymmetries are stronger, markets less transparent and institutional conditions generally weaker.

According to these findings, IPAs help to counterbalance the difficulties of an economic environment characterized by low international attractiveness and competitiveness. The design of an investment promotion architecture should therefore reflect an accurate diagnosis of underlying market and institutional failures, rather than be based on a priori sectoral or geographical targeting choices inspired by domestic development strategies. In an attempt to isolate the importance of IPA functions enhancing the investment environment we look at sectoral heterogeneity. Knowledge intensive FDI are identified as those relying more on the connectivity between foreign investors and domestic firms and institutions, therefore benefitting the most from the improvement of the local business ecosystem triggered by IPAs. The stronger attractive capacity in knowledge intensive sectors identified in our results offers support for the hypothesis that the highest returns from investment promotion efforts come from the removal of practical bottlenecks to investors' operations. This suggestive evidence is also coherent with the explanation that regional IPAs are more effective than national IPAs thanks to their proximity to investors' operations on the ground.

These findings seem to suggest that the devolution of responsibilities for investment promotion in favour of less developed regions, may be a viable policy option to improve their attractiveness to foreign investors, and, possibly, to stimulate their economic development.

Our analysis has important limitations that should be carefully considered when drawing policy conclusions. First, the analysis only captures the impact of IPAs in the attraction of additional foreign investments vis-à-vis what would have happened in absence of the policy. As such, the analysis is silent on whether the additional investment successfully attracted through the activity of IPAs have multiplicative or spillover effects in the host economies. In this regard we can offer only indirect evidence, given that our analysis has shown how IPAs tend to attract FDI of higher technological intensity, which are more likely to trigger positive knowledge spillovers for the local economy (Javorcik, 2004; Branstetter, 2006). Second, our analysis is also silent on the retention capabilities of IPAs, i.e. as to whether and to what extent they can prevent foreign companies from divesting and moving their activities elsewhere. Third, even if regional data are significantly more detailed than

national data commonly used in this literature, stronger results would be obtained by a firm-level analysis comparing individual investment benefitting from IPA support with non-beneficiary investments. These key issues remain in our agenda for future research.

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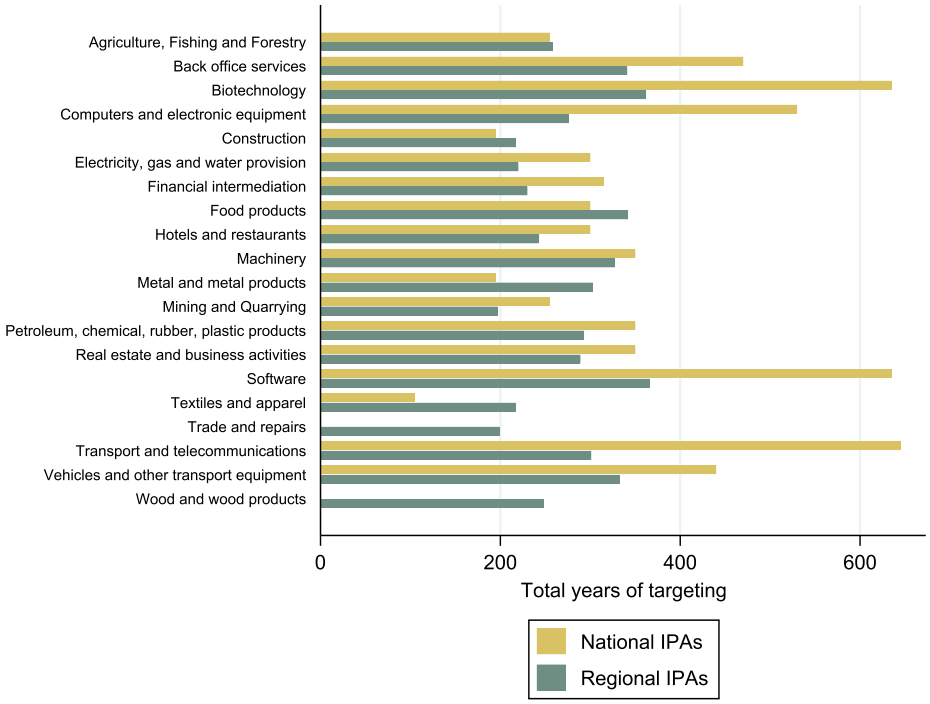
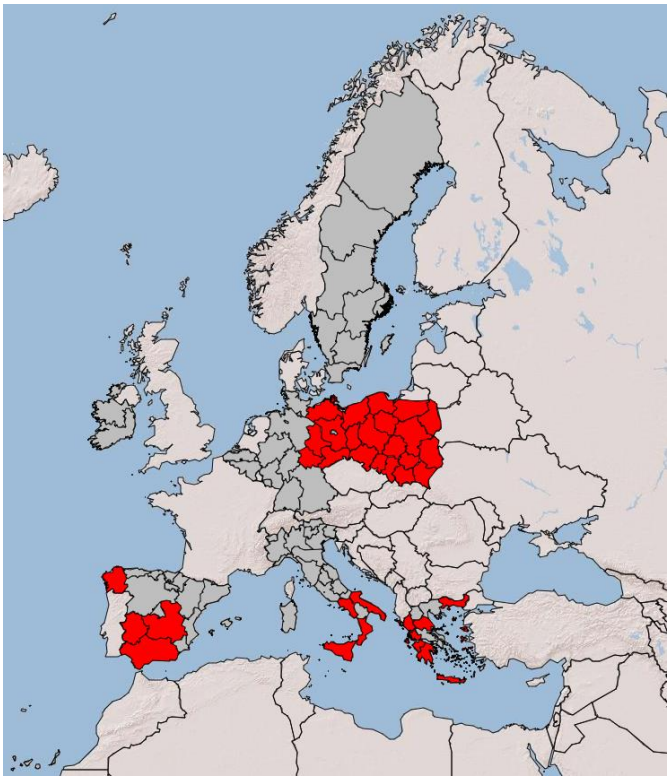
Appendix

Figure A1 – Total years of targeting, regional and national agencies



Note: sample of regions for which information on both national and regional IPA is available. Source: LSE-ERC Survey of IPAs 2018.

Figure A2 – Less developed / advanced regions



Red: ‘less developed regions’ in our sample, according to 2007-2013 EU classification; Grey: regions in sample not classified as ‘less developed’ according to 2007-2013 EU classification.

Figure A3 – Treated/synthetic region-sectors and estimated gap, 2005-2012

(a) (b)

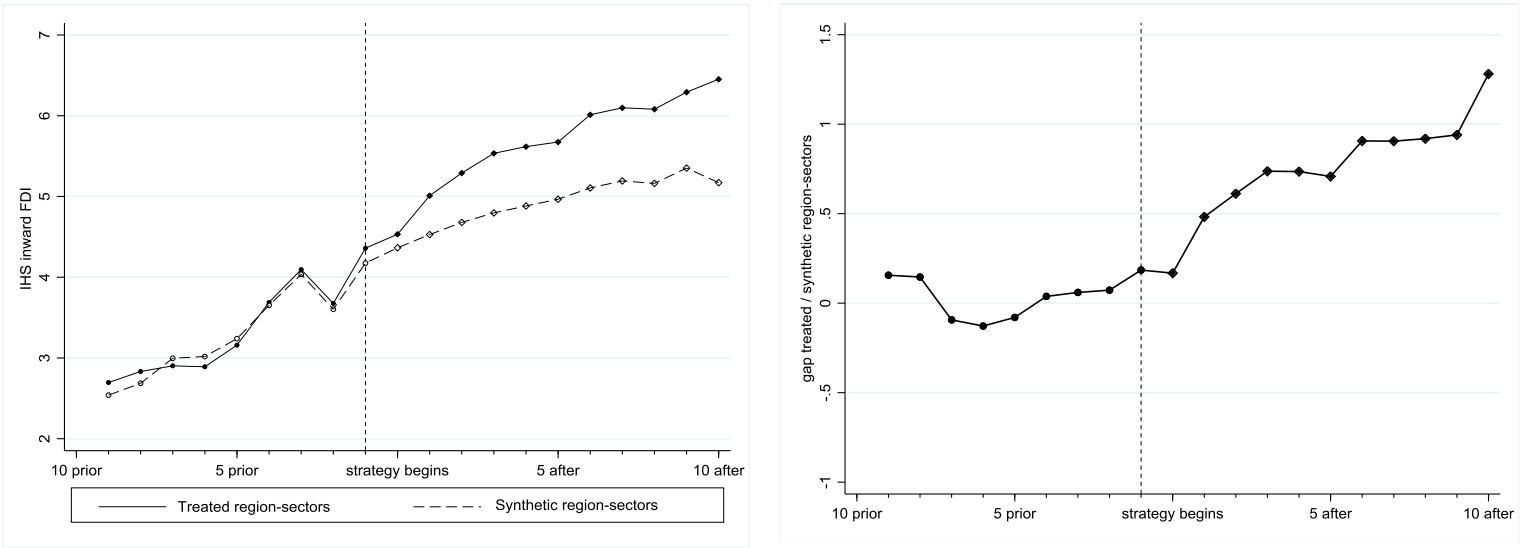


Figure (a): pooled treated/synthetic region-sectors by year before/during strategy. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Continuous line: treated region-sectors; dashed line: synthetic region-sectors. Circles: average pre-treatment values for treated (black) and synthetic (hollow) units by year pre-targeting. Diamonds: average treatment values for treated (black) and synthetic (hollow) units by year during targeting. Figure (b): gap between pooled treated region-sectors and synthetic controls. Circles: average pre-treatment gap by year pre-targeting; Diamonds: average treatment gap by year during targeting.

Figure A4 – Treated/synthetic region-sectors and estimated gap, 2013-2017

(a) (b)

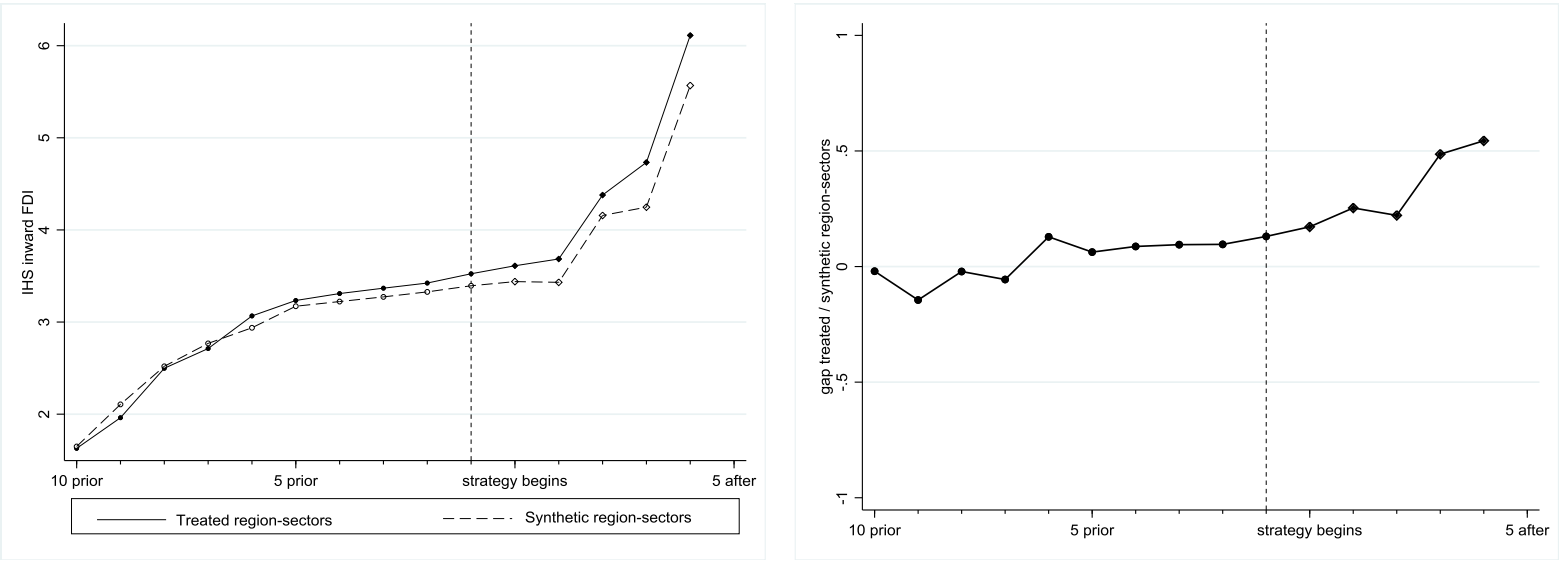
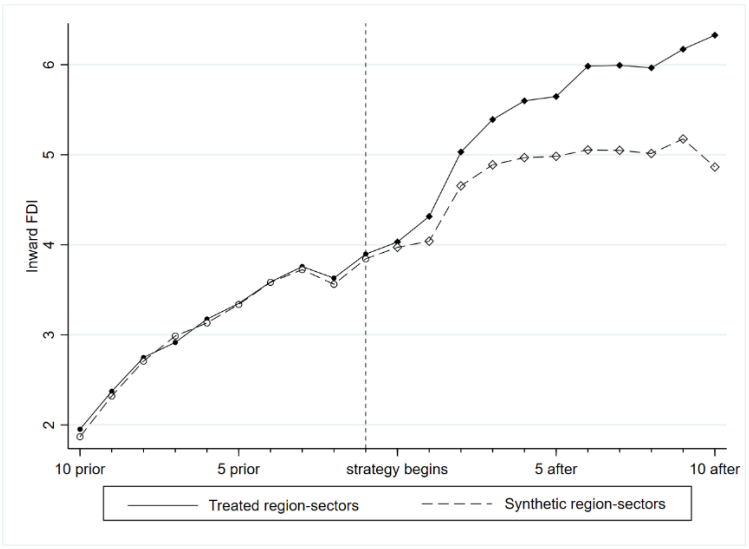


Figure (a): pooled treated/synthetic region-sectors by year before/during strategy. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Continuous line: treated region-sectors; dashed line: synthetic region-sectors. Circles: average pre-treatment values for treated (black) and synthetic (hollow) units by year pre-targeting. Diamonds: average treatment values for treated (black) and synthetic (hollow) units by year during targeting. Figure (b): gap between pooled treated region-sectors and synthetic controls. Circles: average pre-treatment gap by year pre-targeting; Diamonds: average treatment gap by year during targeting.

Figure A5 – Treated/synthetic region-sectors and estimated gap, 2003-2017 (excluding k-4 neighbours)

(a) (b)



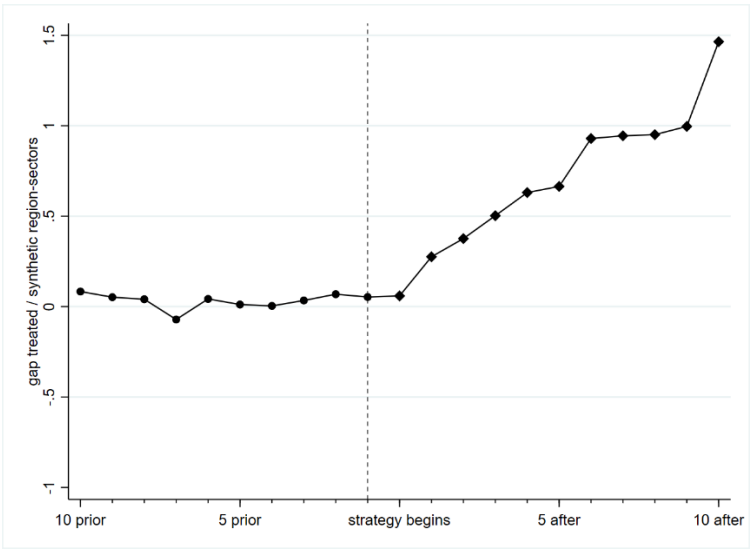


Figure (a): pooled treated/synthetic region-sectors by year before/during strategy. Donor pool excludes k-4 nearest neighbouring regions of each treated regions-sector. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Continuous line: treated region-sectors; dashed line: synthetic region-sectors. Circles: average pre-treatment values for treated (black) and synthetic (hollow) units by year pre-targeting. Diamonds: average treatment values for treated (black) and synthetic (hollow) units by year during targeting. Figure (b): gap between pooled treated region-sectors and synthetic controls. Circles: average pre-treatment gap by year pre-targeting; Diamonds: average treatment gap by year during targeting.

Figure A6 – Treated/synthetic region-sectors and estimated gap, 2003-2017 (less developed regions)

(a) (b)

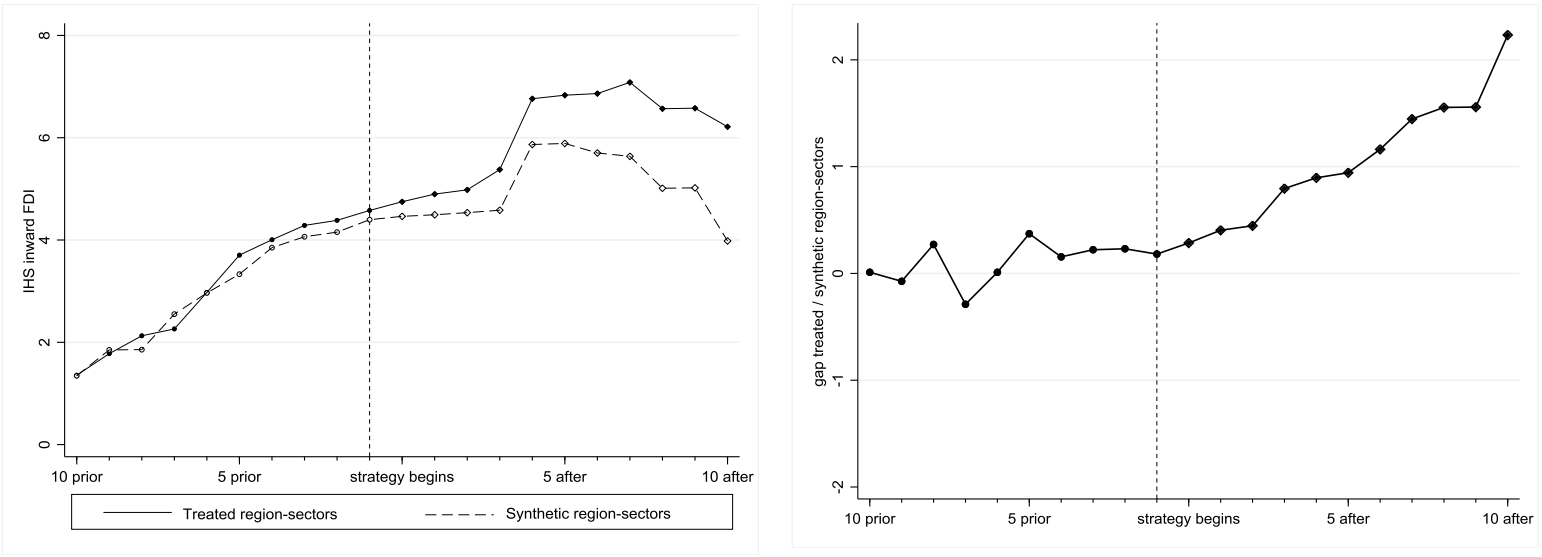


Figure (a): pooled treated/synthetic region-sectors by year before/during strategy. Dependent variable for synthetic control analysis: log cumulative FDI million dollars. Continuous line: treated region-sectors; dashed line: synthetic region-sectors. Circles: average pre-treatment values for treated (black) and synthetic (hollow) units by year pre-targeting. Diamonds: average treatment values for treated (black) and synthetic (hollow) units by year during targeting. The lower value of inward FDI in the years t+8 to t+10 as compared with t+7 is due to the low number of units whose treatment starts in the years 2007, 2008, 2009, 2010. Figure (b): gap between pooled treated region-sectors and synthetic controls. Circles: average pre-treatment gap by year pre-targeting; Diamonds: average treatment gap by year during targeting.

Table A1 – descriptive statistics

Data available:	Only national IPA			Both national and regional IPA					
Sample:	All regions			All regions			Less developed regions		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
FDI dummy	93,300	0.26	0.44	28,800	0.28	0.45	11,100	0.24	0.43
Log million current $ FDI	93,300	26.86	172.13	28,800	28.42	125.66	11,100	24.39	126.76
Log FDI-related jobs	93,300	75.91	525.06	28,800	85.06	379.33	11,100	96.05	483.87
National IPA strategy	93,300	0.27	0.44	28,800	0.39	0.49	11,100	0.44	0.50
Regional IPA strategy	91,980	0.11	0.31	27,480	0.28	0.45	10,680	0.33	0.47
Regional strategy – selected sectors	91,980	0.06	0.23	27,480	0.14	0.34	10,680	0.11	0.32
Regional strategy – all sectors	91,980	0.05	0.22	27,480	0.15	0.36	10,680	0.21	0.41
Log GDP per capita	64,980	9.99	0.65	26,880	9.93	0.57	10,360	9.40	0.48
Unemployment rate	75,620	8.76	5.14	28,680	11.47	6.43	11,100	13.74	6.52
Tertiary educated	76,200	0.25	0.09	28,720	0.24	0.08	11,100	0.22	0.06
Log population	76,200	14.28	0.90	28,800	14.35	1.00	11,100	14.34	0.88
Log population density	82,940	4.77	1.36	26,720	4.80	1.17	10,360	4.56	0.64
Log patent applications	51,740	3.70	1.53	18,380	3.44	1.55	6,760	2.19	1.11

Table A2 – Baseline results, FDI-related jobs as dependent variable

	FDI jobs			
	(1)	(2)	(3)	(4)
National IPA strategy	0.0307			-0.136*
	(0.0504)			(0.0813)
Regional IPA strategy		0.197*	0.216*	0.205*
		(0.115)	(0.115)	(0.115)
Country-sector-year dummies			✓	
Region-year dummies	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓
Observations	74,923	27,441	27,441	27,441
Region-sectors	5000	1920	1920	1920
R-squared	0.587	0.602	0.645	0.602

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Years after the end of targeting strategies excluded from sample.

Table A3 – Dynamic baseline model

	(1)	(2)	(3)	(4)
		Panel A: FDI dummy		
Lagged FDI dummy	-1.030***	-1.033***	-1.043***	-1.033***
	(0.00565)	(0.00902)	(0.00904)	(0.00902)
National IPA strategy	0.0126			-0.0183
	(0.00956)			(0.0152)
Regional IPA strategy		0.0504**	0.0434*	0.0515**
		(0.0241)	(0.0245)	(0.0242)
		Panel B: million $ FDI		
Lagged million $ FDI	-1.019***	-1.029***	-1.044***	-1.029***
	(0.00588)	(0.00947)	(0.00950)	(0.00947)
National IPA strategy	0.0514			-0.0601
	(0.0420)			(0.0688)
Regional IPA strategy		0.237**	0.226**	0.241**
		(0.0980)	(0.102)	(0.0981)
		Panel C: FDI-related jobs		
Lagged FDI-related jobs	-1.021***	-1.022***	-1.038***	-1.022***
	(0.00572)	(0.00919)	(0.00937)	(0.00919)
National IPA strategy	0.0439			-0.145*
	(0.0526)			(0.0816)
Regional IPA strategy		0.246**	0.245**	0.255**
		(0.120)	(0.123)	(0.120)
Country-sector-year dummies			✓	
Region-year dummies	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓
Observations	69,923	25,481	25,481	25,481
Region-sectors	5000	1920	1920	1920

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: panel A: dummy variable for inward FDI towards region-sector in given year; panel B: log million $ inward FDI towards region-sector in given year; panel C: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Years after the end of targeting strategies excluded from sample.

Table A4 – IPAs sector targeting vs. no sector targeting

Dep. var.:	FDI dummy		million $ FDI		FDI-related jobs	
	(1)	(2)	(3)	(4)	(5)	(6)
Regional IPA – selected sectors	0.0484**	0.0487**	0.180**	0.185**	0.229**	0.234**
	(0.0189)	(0.0205)	(0.0772)	(0.0825)	(0.0983)	(0.103)
Regional IPA – all sectors	-0.0251	-0.0207	-0.0978	-0.0654	-0.139	-0.115
	(0.0237)	(0.0281)	(0.0918)	(0.103)	(0.127)	(0.146)
Lagged dependent variable		-1.032***		-1.031***		-1.022***
		(0.00915)		(0.00961)		(0.00943)
Country-sector-year dummies	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	27,441	25,481	27,441	25,481	27,441	25,481
Region-sectors	1920	1920	1920	1920	1920	1920
R-squared	0.562	0.575	0.601	0.577	0.618	0.574

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: dummy variable for inward FDI towards region-sector in given year (columns (1)-(2)), log million $ inward FDI towards region-sector in given year (columns (3)-(4), log jobs created by FDI investment in region-sector in given year (columns (5)-(6)). Treatment dummy variables: 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA; 'Regional IPA – selected sectors' takes value 1 from the beginning of a strategy if a regional strategy is only targeting some sectors. 'Regional IPA – all sectors' takes value 1 from the beginning of a strategy for all sectors of a region if a regional strategy targets all sectors. Years after the end of targeting strategies excluded from sample.

Table A5 – More and less developed regions, FDI-related jobs as dependent variable

	Less developed regions			Advanced regions		
	(1)	(2)	(3)	(4)	(5)	(6)
National IPA strategy			-0.174 (0.179)			-0.118 (0.0929)
Regional IPA strategy	0.535** (0.240)	0.706*** (0.255)	0.552** (0.241)	0.0698 (0.128)	0.0468 (0.130)	0.0757 (0.128)
Country-sector-year dummies		✓			✓	
Region-year dummies	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	10,680	10,680	10,680	16,761	16,761	16,761
Region-sectors	1920	1920	1920	1920	1920	1920
R-squared	0.551	0.605	0.552	0.642	0.693	0.642

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variable: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Less developed regions: regions classified as 'Less developed' for EU funds allocation (GDP pc < 75% EU average); Advanced regions: all other regions in sample. Years after the end of targeting strategies excluded from sample.

Table A6 – More and less developed regions, dynamic model

	Less developed regions			Advanced regions		
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: FDI dummy			
Lagged FDI dummy	-1.028***	-1.044***	-1.028***	-1.039***	-1.046***	-1.039***
	(0.0151)	(0.0162)	(0.0151)	(0.0112)	(0.0111)	(0.0112)
National IPA strategy			-0.00860			-0.0186
			(0.0340)			(0.0175)
Regional IPA strategy	0.115**	0.146***	0.116**	0.0262	0.00904	0.0271
	(0.0498)	(0.0508)	(0.0500)	(0.0272)	(0.0284)	(0.0273)
			Panel B: million $ FDI			
Lagged million $ FDI	-1.024***	-1.038***	-1.024***	-1.033***	-1.052***	-1.033***
	(0.0154)	(0.0171)	(0.0154)	(0.0121)	(0.0117)	(0.0121)
National IPA strategy			-0.0601			-0.0815
			(0.0688)			(0.0798)
Regional IPA strategy	0.539***	0.600***	0.541***	0.122	0.0735	0.126
	(0.203)	(0.213)	(0.204)	(0.110)	(0.119)	(0.110)
			Panel C: FDI-related jobs			
Lagged FDI-related jobs	-1.014***	-1.031***	-1.014***	-1.029***	-1.047***	-1.029***
	(0.0151)	(0.0166)	(0.0151)	(0.0115)	(0.0111)	(0.0115)
National IPA strategy			-0.152			-0.143
			(0.178)			(0.0935)
Regional IPA strategy	0.610**	0.750***	0.625**	0.112	0.0645	0.119
	(0.252)	(0.266)	(0.252)	(0.133)	(0.140)	(0.133)
Country-sector-year dummies		✓			✓	
Region-year dummies	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	9,940	9,940	9,940	15,541	15,541	15,541
Region-sectors	1920	1920	1920	1920	1920	1920

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: panel A: dummy variable for inward FDI towards region-sector in given year; panel B: log million $ inward FDI towards region-sector in given year; panel C: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Less developed regions: regions classified as 'Less developed' for EU funds allocation (GDP pc < 75% EU average); Advanced regions: all other regions in sample. Years after the end of targeting strategies excluded from sample.

Table A7 – More and less knowledge intensive (less developed regions)

	Knowledge-intensive sectors			Low knowledge-intensive sectors		
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: FDI dummy			
National IPA strategy			0.0496			-0.0563
			(0.0575)			(0.0408)
Regional IPA strategy	0.146*	0.208***	0.145*	0.0552	0.0813	0.0603
	(0.0743)	(0.0722)	(0.0742)	(0.0655)	(0.0649)	(0.0662)
			Panel B: million $ FDI			
National IPA strategy			0.0329			-0.155
			(0.260)			(0.172)
Regional IPA strategy	0.807**	1.016***	0.807**	0.212	0.248	0.226
	(0.337)	(0.372)	(0.337)	(0.264)	(0.259)	(0.266)
			Panel C: FDI-related jobs			
National IPA strategy			-0.0692			-0.321
			(0.296)			(0.213)
Regional IPA strategy	0.929**	1.278***	0.930**	0.171	0.253	0.200
	(0.438)	(0.473)	(0.439)	(0.339)	(0.335)	(0.340)
Country-sector-year dummies		✓			✓	
Region-year dummies	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	3,738	3,738	3,738	6,942	6,942	6,942
Region-sectors	1920	1920	1920	1920	1920	1920

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: panel A: dummy variable for inward FDI towards region-sector in given year; panel B: log million $ inward FDI towards region-sector in given year; panel C: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Sample of less developed regions: regions classified as 'Less developed' for EU funds allocation (GDP pc < 75% EU average). High-knowledge intensive sectors: 'Biotechnology', 'Computers and electronic equipment', 'Software', 'Machinery', 'Transport and telecommunications', 'Vehicles and other transport equipment', 'Financial intermediation'. Years after the end of targeting strategies excluded from sample.

Table A8 – More and less knowledge intensive, dynamic model (less developed regions)

	Knowledge-intensive sectors			Low knowledge-intensive sectors		
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: FDI dummy			
Lagged FDI dummy	-1.047***	-1.046***	-1.047***	-1.017***	-1.044***	-1.017***
	(0.0283)	(0.0309)	(0.0283)	(0.0180)	(0.0194)	(0.0180)
National IPA strategy			0.0606			-0.0500
			(0.0596)			(0.0412)
Regional IPA strategy	0.150*	0.207***	0.150*	0.0740	0.0973	0.0790
	(0.0810)	(0.0779)	(0.0808)	(0.0718)	(0.0728)	(0.0724)
			Panel B: million $ FDI			
Lagged million $ FDI	-1.013***	-1.006***	-1.013***	-1.026***	-1.051***	-1.026***
	(0.0294)	(0.0338)	(0.0294)	(0.0185)	(0.0201)	(0.0185)
National IPA strategy			0.0316			-0.104
			(0.267)			(0.176)
Regional IPA strategy	0.866**	1.048***	0.865**	0.341	0.337	0.351
	(0.361)	(0.383)	(0.361)	(0.281)	(0.277)	(0.282)
			Panel C: FDI-related jobs			
Lagged FDI-related jobs	-1.012***	-1.010***	-1.012***	-1.013***	-1.042***	-1.014***
	(0.0283)	(0.0319)	(0.0283)	(0.0183)	(0.0199)	(0.0183)
National IPA strategy			-0.0660			-0.266
			(0.302)			(0.212)
Regional IPA strategy	0.955**	1.271***	0.956**	0.304	0.341	0.331
	(0.451)	(0.474)	(0.451)	(0.354)	(0.352)	(0.354)
Country-sector-year dummies		✓			✓	
Region-year dummies	✓	✓	✓	✓	✓	✓
Sector-year dummies	✓	✓	✓	✓	✓	✓
Region-sector dummies	✓	✓	✓	✓	✓	✓
Year dummies	✓	✓	✓	✓	✓	✓
Observations	3,479	3,479	3,479	6,461	6,461	6,461
Region-sectors	1920	1920	1920	1920	1920	1920

Clustered standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Dependent variables: panel A: dummy variable for inward FDI towards region-sector in given year; panel B: log million $ inward FDI towards region-sector in given year; panel C: log jobs created by FDI investment in region-sector in given year. 'National IPA strategy' takes value 1 from the beginning of a strategy of a national IPA for all regions of a country; 'Regional IPA strategy' takes value 1 from the beginning of a strategy of a regional IPA. Sample of less developed regions: regions classified as 'Less developed' for EU funds allocation (GDP pc < 75% EU average). High-knowledge intensive sectors: 'Biotechnology', 'Computers and electronic equipment', 'Software', 'Machinery', 'Transport and telecommunications', 'Vehicles and other transport equipment', 'Financial intermediation'. Years after the end of targeting strategies excluded from sample.

Table A9 – Number of treated/donor region-sectors by year and treated/synthetic by period

A4.1 Treated by year

Year	Treated region-sectors
2005	16
2006	0
2007	7
2008	9
2009	3
2010	1
2011	6
2012	19
2013	8
2014	18
2015	18
2016	28
2017	5
Total	138

A4.2 Observations for pooled data by period

Year before / during strategy	Treated and synthetic region-sectors
-14	5
-13	33
-12	51
-11	69
-10	77
-9	96
-8	102
-7	103
-6	106
-5	115
-4	122
-3	122
-2	138
-1	138
0	138
1	133
2	105
3	87
4	69
5	61
6	42
7	36
8	35
9	32
10	23
11	16
12	16

Table A10 – Number of treated/donor region-sectors by year and treated/synthetic by period

A4.1 Treated by year

Year	Treated region-sectors
2005	0
2006	0
2007	2
2008	1
2009	2
2010	2
2011	7
2012	1
2013	0
2014	14
2015	6
2016	1
2017	0
Total	98

A4.2 Observations for pooled data by period

Year before / during strategy	Treated and synthetic region-sectors
-13	1
-12	7
-11	19
-10	19
-9	20
-8	27
-7	28
-6	29
-5	30
-4	32
-3	32
-2	32
-1	32
0	32
1	32
2	31
3	25
4	13
5	13
6	12
7	5
8	4
9	3
10	2

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