DOI: 10.47743/ejes-2022-0202

Trade and FDI connectivity in Europe: the European Union, Western Balkans and new EU candidate countries

Alena DORAKH*

Abstract

The escalation of geopolitical tensions with the prospect of the European Union (EU) enlargement make connectivity a defining feature of European integration, which in turn facilitates trade and foreign direct investment (FDI) in the region. This paper uses a panel data approach for 39 countries over 2000-2020 to verify the connectivity among the economic and institutional factors affecting the FDI flows within Europe versus the European and non-European countries (focusing on China) in terms of three key issues. First, we hypothesize that the ability of countries to connect through FDI and trade on global and regional levels will affect how they might maximize the benefits of European integration. Second, we extend the existing FDI estimated models by adding our received indices to investigate the effects of connectivity on FDI inflows in Europe. Finally, we incorporate institutional factors in the empirical model and use interaction terms between the host country and integration dummy variable to capture how the effect of policy stability influenced FDI inflows across Europe. A relatively high drop in trade costs between the Western Balkans and the EU (-45%) over the period 2000-2020 indicates a high level of integration within Europe. But the decline (-35%) in trade costs between the EU and China over the same time period points to integration with non-EU partners. As a result, trade and FDI connectivity are still more global than regional.

Keywords: connectivity, trade costs, European integration, EU membership, Chinese investment, GMM, Granger causality

Introduction

Given the geopolitical risks and post-pandemic recovery in Europe, connectivity is acting as a driving force for greater European integration and more substantial foreign direct investment (FDI) and trade. With extensive global and

*Alena DORAKH is researcher at Trier University, Trier, Germany; e-mail: s4aldora@uni-trier.de. ORCID: 0000-0003-4933-1073

regional connectivity links, Europe is the largest trade and investment partner of nearly every country. Before the crisis, the region was the destination for almost half of the global FDI flows. Over the period 2010-2020, Europe is the largest destination of FDI stocks in the world, accounting for more than one-third (35%) of all inward investment positions (UNCTAD, 2022).

Likewise, EU membership and participation in an Association Agreement (AA) with access to the common market allow European companies to become highly intertwined and make the EU a regional trade and FDI leader. Namely, the EU accounted for around 80% of all European FDI. Despite the fall in EU inflows last time, the European Union is still the leading source of FDI in Europe: the majority of FDI projects every year are undertaken by EU investors. Recent overall positive FDI growth in Europe is driven by investment flows to the Western Balkans and some other non-EU economies (WIR, 2021; 2022).

Connectivity across Europe matters since the EU's economic and political influence in the region might be as effective as its trade and investment connections to partners get stronger. The old EU member states (France, the Netherlands, and Germany) are generally net investors while the new EU member states (Poland, Hungary, and Romania), the candidate countries and new EU applicants (the Western Balkans, Turkey, Ukraine, Moldova, and Georgia) are generally net recipients of intra-European FDI. In any case, intra-European FDI activities benefit Europe: both the host region (as FDI inflows) and the home region (as FDI outflows).

Extra-European FDI flows mainly benefit a home country through access to new markets and enhancing connectivity. Until 2009, there was a clear tendency for extra-European FDI toward EU-15 countries: Germany, the UK, France, Italy, and Spain accounted for almost 60% of total extra-European FDI. Since the 2010s, the Western Balkans and later some other non-EU economies (Ukraine, Moldova, and Georgia) have been covered by the Association Agreement (AA) with trade and FDI preferences that pushed its connectivity partnerships with European and non-European investors. Over the last eight years, as the EU's trade and FDI involvement in the region declined, Chinese investment increased and doubled in some European countries (Kratz *et al.*, 2021).

Despite the largest share of non-European FDI towards Europe in 2020 originating in the United States (US) (European Commission Report, 2021), we examine European connectivity, focusing on China for several reasons. First, Europe is the largest exporter to China, and China took over the position as the EU's third trade partner for good in 2020. China is still a supplier of infrastructure connectivity and one of the largest investment sources for most European countries. In addition, Chinese investments cover all regions of Europe: the EU countries, the Western Balkans, and Eastern Europe have become preferred destinations.

Second, the relations between China and the European Union (EU) are undergoing the most pronounced changes. The new phase of EU-China connectivity over 2019-2020, in turn, has reduced Chinese FDI in the EU and the UK to its lowest value since 2010 (European Commission Report, 2021). Third, while European connectivity stimulates FDI flows from outside investors, recent concerns about Chinese investment and reinforcing trade barriers might have the opposite effect, increasing incentives for intra-regional FDI that might be a policy issue. It also provides security for those EU members and candidates that do not have the FDI screening or regulation mechanism.

For the new EU candidates and applicants (Ukraine, Moldova, and Georgia), the EU is the largest trade and FDI partner, accounting for 52% of the total trade of Moldova, 39% for Ukraine, and 22% for Georgia in 2020[1]. Before the war, Ukraine hosted more than 60% of EU outward FDI stocks in the region. The war is expected to consolidate these connections (Ruta, 2022), and the EU accession might be a driver of its modernization and policy stabilization.

European connectivity, therefore, holds the potential to enhance economic growth through trade and FDI for each country. In this paper, we demonstrate that connectivity should not be seen as a country-level factor, but as a regional and sub regional determinant of FDI within and outside Europe.

From the initial analysis in this paper, we verified that connectivity has sharply increased the prospects of European integration which, in turn, has facilitated both trade and FDI in the region. However, the literature about connectivity as an indicator of economic cooperation or its effects on trade and FDI is more ambiguous. While most trade models include trade cost as an empirical determinant, in the FDI models, trade and investment costs are typically not examined.

This study contributes to the existing literature in terms of three main issues. First, we suggest a variable linked to European integration, trade costs, and FDI. In a broad sense, we employ connectivity as a moderating policy variable of economic integration expressed through trade and FDI within and between European (focusing on the EU) and non-European partners (focusing on China). To quantify connectivity for our aim, we calculate trade cost indices with FDI restrictiveness from observable trade data for each country and its partners from our unique sample, based on Novy (2013).

Second, to investigate the effects of connectivity on FDI inflows in Europe, we extend the existing FDI estimated models by adding, besides the physical (Arvis and Shepherd, 2011) and the digital (Adedoyin *et al.*, 2020) infrastructure proxies, a new explanatory variable, i.e. our received indices. It allows verifying whether the foreign direct investment in Europe is likely to be more affected by intra-European or extra-European connectivity and for differentiating its impacts between the EU, Western Balkans, and the new EU candidates and applicants (Ukraine, Moldova, and Georgia).

Third, we further argue that it is also equally necessary to verify among country-specific FDI determinants the country's uncertainty and FDI policy factors.

[1] UN Comtrade Database (2022), retrieved from https://comtrade.un.org/data.

Thus, we use interaction terms between the host country and integration dummy variable to capture how the effect of policy stability influenced FDI inflows across Europe. In addition, as an empirical contribution, this paper uses a new difference Generalised Method of Moments (GMM) estimator of a linear dynamic panel-data model introduced by Kripfganz (2020). Besides traditional estimators, the results are obtained by applying the most recently available various econometric tools, i.e. cross-sectional dependence test, the second-generation unit root tests, cointegration test, and the causality test between FDI and GDP per capita.

The remainder of this paper is organized as follows. Section 1 reviews the literature on the effects of economic, political, and institutional factors on FDI. Section 2 describes the methodology for calculating trade cost indices and discusses the role of trade costs in determining FDI. Section 3 applies the empirical analysis of the FDI determinants in Europe. Section 4 presents the empirical results, comparing across data sets and different model specifications. Section 6 concludes the study with the main findings and implications.

1. Literature review

The connectivity initiative is the latest tool for cooperation and integration between countries, which in turn has facilitated trade (Buchan *et al.*, 2012) and increased FDI attractiveness (Gould *et al.*, 2021).
While many studies investigate the link between connectivity and aggregate trade flows (Vidya *et al.*, 2020) or visualize it through infrastructure projects (Palit, 2019; Vidya and Taghizadeh-Hesary, 2021), the relationship between connectivity and the national FDI flows has not been widely covered.

Connectivity, including trade costs, is associated with both trade and investment across European borders and, thus, might encourage or impede economic integration. Discussions about European integration instead focus on trade effects of European Union (EU) membership, though the potential impact on FDI has also been recognized (Bruno *et al.*, 2020; Hunady and Orviska, 2014; Welfens and Baier, 2018). For measuring the degree of European integration, authors mainly use dummies to capture the impact of EU membership or others forms of integration. In his context, the paper investigates how EU membership and Association Agreement (AA), as proxies of connectivity, affect FDI. However, these indirect measures assume that the impact for all countries is the same. So, in addition to the dummies, a direct measure that also reflects investment restrictiveness and trade barriers might be more appropriate.

Since changes in trade costs lead to shifting the value of FDI (Anderson *et al.*, 2019; Derudder *et al.*, 2018), in this paper, we explore the impact of connectivity on FDI through trade costs with FDI restrictiveness. Carr, Markusen and Maskus (2001) suggest the need to include distance, trade costs and investment costs as separate determinants of FDI.

In the empirical literature, the importance of trade costs in determining the pattern of FDI is suggested by the gravity approach (Bruno *et al.*, 2020; Kox and Rojas-Romagosa, 2019), and geographical distance is used as a proxy for trade costs. Although trade and FDI patterns show clear gravity characteristics, in this modelling, individual country factors are usually hidden in the fixed effects and not allowed to understand country-specific determinants. Moreover, it is hard to explain policy changes. At a time when there is no change in the distance between countries, connectivity, which implies trade, transport, and investment costs, might be the most influenced factor for the FDI activity (Chen and Lin, 2018; Gould *et al.*, 2021).

Cardamone and Scoppola (2012) assess the impact of trade costs on FDI in the EU but, contrary to our aim, examined the outward stocks of FDI. While there is a considerable amount of work examining the impact of trade policy on the pattern of FDI, studies focusing on Europe as a whole are few, and they mainly investigate the intra-European FDI. This study demonstrates the FDI pattern and determinants of European countries with countries outside the EU. Moreover, for the first time, we design the FDI model for all countries that entered the process of becoming a EU member state, including the new EU candidates and applicants (Ukraine, Moldova, and Georgia).

The recent papers verify the relationship between trade position and FDI in the EU and the Western Balkans (Ercegovac *et al.*, 2022) or investigate the impact of European integration on capital flows to prospective the EU member states (Jirasavetakul and Rahman, 2018; Kaya and Haan, 2022). However, we estimate the impact on FDI for a much wider range of countries and over a much longer time period than those used in previous studies.

Theoretical models suggest that enhancing connectivity as a factor in promoting FDI typically requires low trade costs to be maintained between the partners (Duval and Utoktham, 2014). Most trade theory pieces provide negative relations between trade costs and value of trade, but not with FDI. Knowledge-capital models of FDI (Markusen, 2002; Bergstrand and Egger, 2007) suggest that, depending on the nature of FDI, trade costs may have different impacts. They are expected to positively affect horizontal FDI, and to have a negative impact on vertical FDI. More recent international trade models show that FDI inflows may be neither horizontal, nor vertical as export-platform FDI (Ekholm *et al.*, 2007). However, with aggregate FDI flows, it is hard to differentiate between FDI motivations.

While the literature provides a wide range of FDI determinants, such as economic size and growth (Bevan and Estrin, 2004; Blonigen and Piger, 2014); openness to trade (Asiedu, 2002; 2006); infrastructure development (Canh *et al.*, 2020), and regulatory or institutional quality (Kaushal, 2021); connectivity, which is intrinsically related to FDI, is not examined. Some studies, namely Bakar *et al.* (2012), Bailey (2018), and Palit (2019), have pointed out that FDI attractiveness and trade activity are heavily influenced by geopolitics and regional prospects but do not consider the country's ability to connect with partners, whereas connectivity, investment regulatory and trade barriers are important components of trade costs (Arvis *et al.*, 2016).

A focus only on the direct impacts of connectivity on FDI and trade in Europe often misses some of the wider effects. For instance, Chen and Lin (2011) found that improved infrastructure and connectivity in Europe resulted in Chinese investments in determining FDI. One of the most salient features of the international economy has been the rise of digital infrastructure with information and communication technology (ICT) being a key determinant of FDI (Adedoyin *et al.*, 2020). Samina *et al.* (2019) investigate the impact of institutional quality and political stability on FDI inflows.

This paper contributes to the literature by verifying and expanding the range of FDI determinants and constructing FDI estimated model with connectivity as an explanatory factor for the pattern of FDI in Europe and as an indicator of European integration.

2. Connectivity as a determinant of FDI and trade in Europe

Despite the fact that trade costs, as a proxy of connectivity between countries and regions, matter for international trade, investment, and European integration, quantitative estimates of such determining factors have been lacking. Based on the applied international trade literature, we measure connectivity via international trade costs. It is important to note that this measure includes the cost of trading, costs of transactions, trade policy barriers, the cost to comply with foreign regulations, communication costs, and transport costs as possible components of trade and FDI connectivity. In abroad sense, trade costs include all additional costs involved in trading goods bilaterally relative to those involved in trading goods domestically. This approach leads to a bilateral gravity equation of international trade (Anderson and van Wincoop, 2004; Novy, 2013; Duval and Utoktham, 2014).

2.1. Measuring connectivity via international trade costs

To assess the impact of connectivity, specifically trade costs, on the patterns of FDI in Europe, we first calculate trade costs and then include our received indices into the empirical model. Borrowing the standard gravity equation from Novy (2013), we compute trade costs indices from the observed pattern of trade between sample countries. Intuitively, if a country trades more domestically, the higher its average international trade cost and the lower its level of connectivity.

To calculate trade costs and later examine their impact on FDI inflows in Europe, we create two different datasets for trade flows and FDI inflows, respectively. First, we use a bilateral, comprehensive data set of aggregate annual bilateral trade flows between 39 European and non-European countries that cover most of the European trade from 2000 to 2020. Also, to enable an analysis of trade costs at the subregional level, various country groups were identified. Second, we create the data set of the unilateral FDI inflows in Europe to examine trade costs as a determinant of FDI.

The total bilateral trade costs are calculated based on the Novy (2013) inverse-gravity method:

$$t_{ij} = \left(\frac{X_{ii}X_{jj}}{X_{ij}X_{ji}}\right)^{\frac{1}{2(\sigma-1)}} - 1 \qquad (1)$$

where:
t_{ij} denotes geometric average trade costs between country i and country j
X_{ij} denotes international trade flows from country i to country j
X_{ji} denotes international trade flows from country j to country i
X_{ii} denotes intranational trade of country i
X_{jj} denotes intranational trade of country j
σ denotes elasticity of substitution.

According to Formula (1), trade costs show how much more expensive bilateral trade is relative to domestic (intranational) trade. The value of intranational trade is defined as a gross domestic product (GDP) minus export since gross output data is not available for most EU candidate countries and new EU applicants.

Bilateral international trade (export) flows from 2000-2020 are obtained from the UN Commodity trade database (Comtrade). GDP and gross exports, which are used in the calculation of bilateral intranational trade, are obtained from World Development Indicator (WDI). Following past literature (Novy, 2013), elasticity of substitution is assumed to be constant over time and set at σ =8.

Based on equation 1, we first compute trade costs for each of the 38 European countries with respect to European and non-European trade partners over the period 2000-2020. European countries here include all EU members, the Western Balkan countries, Ukraine, Moldova, and Georgia. As a special case, Turkey is also included since the country is recognized as a EU candidate and located in both Asia and Europe. As a European partner, we present the European Union. As a non-European partner, we suggest China since the country became the EU's third trading partner for good in 2020.

Then, we calculate costs at the subregional level. For this, three groups of countries are formed based on the process of joining or membership of the EU: the group of EU members, EU candidates and potential candidates, and the new EU candidates and applicants. Namely, the EU group (EU) consists of all 27 (28) EU member states; the group of EU candidates and potential candidates (WB) includes Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, and Serbia; and the new EU candidates and applicants (NEW_APPL) group includes Ukraine, Moldova, and Georgia. Following the equation (1), average trade costs within all subregions (groups) are imposed. Subregional trade costs are calculated as simple averages of bilateral trade costs of countries within each subregion (the EU, the Western Balkans, and the new EU candidates and applicants).

Finally, to achieve our aim to examine the impact of connectivity on FDI, we calculate trade costs between subregions and their European (EU) and non-European partners (China), using the average aggregate trade costs of subregions in various years. As a final result, we obtain two series of trade cost indices: individual average trade costs for each country from the sample with their trade partners; and average aggregate trade costs within and between subregions (Figure 1, left panel).

2.2. The patterns of FDI and the role of trade costs

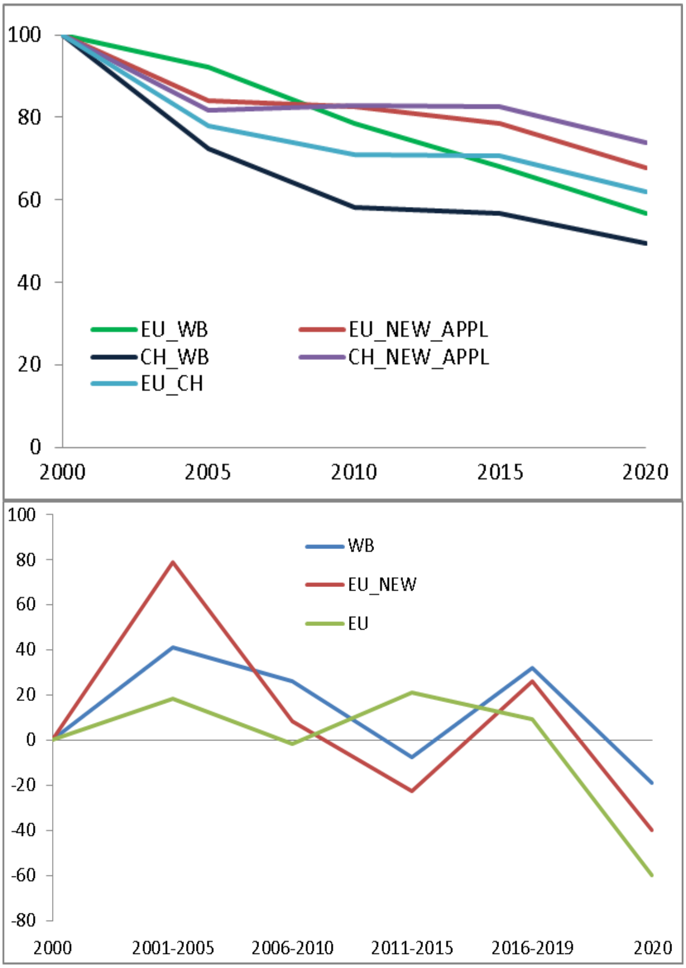
The effectiveness of connectivity as an indicator of European integration and a factor of trade and FDI is likely to be accessed by comparing trade cost indices with growth rates for FDI across Europe over time (Figure 1). Since the computed trade cost indices are not comparable in terms of levels over time, trade cost indices are normalized to 100 for the initial observation in 2000 (Figure 1).

Figure 1 shows that overall trade costs in Europe have declined between 2000 and 2020. The most pronounced decline in average international trade costs, relative to domestic, was for the EU candidate countries (Western Balkans) with both European (EU) and non-European (China) partners. There is a nearly 45 percent decrease in trade costs for the EU (EU_WB) and roughly 50 percent for China (CH_WB), respectively. It can be noted that most of the decline in trade costs between the Western Balkans and the EU falls in the period 2005-2010. This was the time for applications for European Union membership from North Macedonia (submitted in 2004), Montenegro (2008), Albania (2009) and Serbia (2009). In 2005, Bosnia and Herzegovina, and later Kosovo started the EU Stabilization and Association negotiations for future EU membership. It is a coincidence that enhanced connectivity and reduced trade costs have grown in tandem with regional integration and multilateral trade and investment agreements.

Trade costs between the Western Balkans and China declined faster than those between the Western Balkans and the EU until 2016, but later, the two series moved in parallel. Perhaps the benefits of lower trade costs will diminish over time or the status of the EU candidate and potential candidate has led to a shift in trade within Europe, or the regulation of Chinese trade and FDI inflows has changed.

All at once, a relatively high drop in trade costs between the Western Balkans and the EU (-45%) over the period 2000-2020 indicates a high level of integration within Europe. But the decline (-35%) in trade costs between the EU and China over the same time, points to integration with non-EU partners. It is consistent with previous studies (Beltramo, 2010), with an average of 32% trade costs drop between the EU and the large non-European trading partner (China). However, as seen in Figure 1(left panel), a drop in trade costs between China and the European Union (EU) over 2019-2020 slowed down, which is most likely to be explained by EU international policy, in particular the increase in trade barriers, and the introduction of an FDI screening mechanism.

Figure 1. Trade costs, 2000=100 (upper panel) and annual average growth rates for FDI (bottom panel), %



Source: Trade costs calculated based on the paper by Novy (2013), growth rates of FDI calculated based on the UNCTAD data (2022)

While the average trade costs between the new EU candidates and applicants (Ukraine, Moldova, Georgia) and the developed countries (the EU) and non-European partners (China) consistently decline throughout the entire period (-32% and -25%, respectively), they still exceed the costs of trade in the Western Balkans. Since 2016, when the countries began to implement Association Agreements (AA), trade costs of the new EU candidates and applicants have fallen significantly. Moreover, trade costs with the EU are found to have fallen faster than with China during the period considered.

After examining indices and trends in trade costs for selected countries, we intend to underscore that the trade cost measure is economically sensible as a determinant of FDI and a proxy for the European integration level. For this, we investigate patterns of FDI in Europe as a whole (Figure 1, bottom panel) and compare the growth indices of FDI between three European subregions, including the European Union (EU), the Western Balkans (WB), and the new EU candidates and applicants (Ukraine, Moldova, and Georgia).

Figure 1 shows that total FDI in Europe increased between 2000 and 2010 following EU enlargement in 2004 and despite falling in 2009 due to the global financial crisis. However, the growth rate of FDI in the EU was lower than the growth rate of FDI in the Western Balkans (WB) and the new EU candidates (EU_NEW) over the period 2005-2010. One reason for this is that with the reducing trade costs (Figure 1), investment into the EU from non-EU countries was lower than the EU outward investment in those countries.

Between 2011 and 2016, there was a low recovery of the growth in the EU direct investments, reaching a peak of 22% in 2015, which was attributed to large global mergers. With a decline over the period 2017-2019, due to a change in US tax policy, Brexit, and the sharpest reduction of Chinese investments into Europe, the FDI flows dynamics in the EU have been rather weak. In 2020, not only the pandemic but also trade restrictions and FDI screening regimes reduced FDI in the EU.

The growth rates for FDI in the Western Balkans from the first half of the 2000s, when the countries applied for EU membership, became higher than for the EU countries. In the period 2005-2010, inward FDI was lifted by growing cooperation with the EU (WIR, 2020). Despite the majority of inflows in the 2010s coming from the EU developed countries, Chinese investment in the subregion has doubled. As trade costs are reduced sharply (Figure 1), China is becoming the fourth largest source country in transition economies (WIR, 2020). In the 2018-2019 periods, the region received a relatively higher level of foreign investment than in previous years since investor interest has shifted towards the Western Balkans, which was close to catching up with some EU members in terms of economic growth. Of all the subregions, the Western Balkans was the area where FDI was least impacted by the pandemic in 2020. This effect is likely to be related to the resilience of EU integration which appears to promote investment programs in the region (WIR, 2021).

Since the 2000s, Ukraine, Moldova, and Georgia became immediate neighbours of the EU, increasing growth rates for FDI in the subregion. The EU enlargement of 2004 created main connective and logistical advantages for these countries. In the 2011-2015 period, following the financial crisis and the geopolitical conflict in Ukraine, FDI flows to the subregion declined by 27%, the lowest level since 2000. Despite the difficult business environment in Ukraine over 2016-2019, a project finance agreement was signed with Chinese investors (WIR, 2021). Besides the pandemic, the reducing growth rates for FDI from 2020 are likely to be a result of the geopolitical risk, trade tensions, and the more protectionist FDI policy, since the EU adopted a regulation screening of FDI from non-EU countries. Indeed, it is in line with the trend of slowly reducing or even increasing trade costs in the region (Figure 1).

As one can see, while trade costs between countries decrease gradually over time (Figure 1), the FDI growth for all countries in the sample progressively increases (Figure 1) over the entire period. Thus, the causality between connectivity and FDI is confirmed. The importance of trade costs in determining the pattern of FDI is suggested here by theoretical models and observing the FDI dynamics in the selected countries.

3. Panel data analysis of the FDI determinants in Europe

The links between trade costs and flows of trade and FDI constitute a key research question: reduced trade costs are likely to promote trade (Anderson and van Wincoop, 2004; Arvis *et al.*, 2016) and FDI (Duval and Utoktham, 2014) in the region. Consequently, European integration forms and treaties (the EU, Association Agreements), linked to lower bilateral trade costs, might also force FDI growth (Bruno *et al.*, 2020; Beltramo, 2010). Thus, the hypothesis is that with progressively reduced trade costs, more FDI is likely to be attracted to the region and European integration is enhanced, unlike when connectivity is limited.

Once trade costs for different countries and subregions and their European and non-European trade partners are computed, the existing FDI estimated models by are extended by adding, besides others, the resulted indices as an explanatory variable. We verify connectivity among the economic and institutional factors affecting the FDI and create an empirical model to investigate the impact of connectivity on FDI flows in Europe over the period 2000-2020.

3.1. Model specification and data

This paper uses unbalanced panel data of annual FDI inflows in 38 European countries from 2000 to 2020. The novelty of our approach is the inclusion in the sample of all countries that have or will soon receive the EU membership. First of all, our sample consists of all EU members. Due to the fact that the United Kingdom (UK) left the EU on 31 January 2020, the data for EU countries has been updated to include 27 member-states instead of 28. The Western Balkans and Turkey as EU candidates and potential candidates are also included. And for the first time in the EU context, the sample includes Ukraine, Moldova, and Georgia as new EU candidates and applicants. We select the sample and period according to the recent data availability.

Until 2022, Ukraine and Moldova have not yet been granted the EU candidate status but have signed an Association Agreement (EU_AA) as priority partners for the European Union. Georgia recently applied for the EU and formally signed in 2014 the Association Agreement, thus enhancing its relationship with the EU.

Based on the literature, we suggest the following baseline model:

$$ln\_FDI_{it} = \beta_1 ln\_GDP\_PC_{it} + \beta_2 t_{it} + \beta_3 EU_{it} + \beta_4 EU\_AA_{it} + \beta_5 ln\_OFDI\_CH_{it} + \beta_6 Policy\_stab_{it} + \beta_7 ln\_IT_{it} + \beta_8 ln\_Internet_{it} + u_{it} \quad (1)$$

where ln_FDI_t is a logarithm of FDI inflows to country i at time t, $ln\_GDP\_PC_{it}$, t_{it}, EU_{it}, EU_AA_{it}, $ln\_OFDI\_CH_{it}$, $Policy\_stab_{it}$, ln_IT_{it}, $ln\_Internet_{it}$, are the explanatory variables, and u_{it} is the composite error term consisting of fixed effects and the idiosyncratic error term. The time horizon is 2000-2020 (T=21), the number of countries is 38 (N=38) and changes according to the year (making an unbalanced panel) because some observations are missing.

As a dependent variable, we use FDI inflows, which is the *net inflow of FDI* expressed in million U.S. dollars. To compare the values of FDI over time, FDI inflows are deflated using the domestic GDP deflator for each country. We prefer FDI flows over FDI stocks since FDI stocks are the accumulation of past flows and static, while flows are the current transactions taking place in a certain year *t* and dynamic. FDI flows are taken rather than stocks also because the other series (*Chinese FDI outflows*, *IT*) are flow variables as well. We take the FDI variable in a logarithmic form to reduce potential heterogeneity since the number of zero values represents only around 6 % of the total number of observations in our data.

As independent variables, in addition to trade costs, we take country-level macroeconomic and institutional factors of FDI that have been identified by a rich empirical literature. Details on the definition, methods of calculation, and sources of dependent and independent variables are presented in Appendix (Table A1).

Traditionally, Gross Domestic Product (GDP) is defined as the most comprehensive FDI determinant, measuring the country's economic output. Moreover, for countries with different levels of income, as in our sample, the GDP per capita is often included (Bruno *et al.*, 2020). The GDP per capita ($ln\_GDP\_PC_{it}$) might be seen here as a rough indicator that measures both a market size and a country's economic development. For investors, it is also an indicator of the purchase power of citizens in a given country. By analogy with FDI inflows, we use the logarithm of GDP per capita ($ln\_GDP\_PC_{it}$) to deal with its skewness. Likewise, values of GDP per capita are deflated using the domestic GDP deflator for each year. Real GDP per capita removes the effects of inflation and becomes a better measure of living standards across countries.

In addition to previous studies, we examine the impact of EU integration on FDI inflows for all countries that, at some point, are considered as one EU member, a candidate, or new applicants. To this end, FDI inflows in Europe regressed on the EU membership dummy (*EU*) and the European Union Association Agreement dummy (*EU_AA*) for non-EU countries, which allows estimating the effects of the preparation process for the EU accession. The variable EU_{it} is a dummy that captures the effect of EU membership of the country *i* (equals 1 if a country is a EU member at time *t*, 0 otherwise).

The effects of Association Agreements (AA) here consider the agreements between the EU and EU candidates and applicants with providing a future EU membership. The variable EU_AA_{it} captures the agreements that have been recently signed between the EU and non-EU countries, namely, the Western Balkans, and the new EU candidates and applicants (Ukraine, Moldova, Georgia). The Association Agreement between the EU and Turkey (the Ankara Agreement) is also included. European Agreements that the countries, now EU members, had before their own EU accession are not covered. So, the coefficients of dummies examine a current effect of EU candidacy status on FDI. The variable EU_AA_{it} equals 1 if AA for the country *i* entries into force at time *t*, and 0 otherwise.

Our primary variable of interest is trade costs (t_{it}). In Model (1), the variable t_{ij} is an index of individual average trade costs between each country from the sample and all their partners, namely, total value of trade costs to the rest of the world. The individual index shows whether the impact of EU integration on FDI inflows works through improved connectivity in the host country.

To examine whether trade costs are related to intra-European or non-European flows, it is necessary to disaggregate the indices at the sub-regional level. As China is one of the influenced trade and investment partners in Europe, we include in the model a variable of China's FDI net outflows ($ln\_OFDI\_CH_{it}$) in logarithmic form. Jointly with trade costs effects, it allows us to assess the potential role of China in shaping the patterns of FDI in the EU members as well as in the EU candidates and applicants. In addition, it should be taken into account that China mainly invests in infrastructure and the information and communication technology (ICT) sector in Europe.

The study focuses on the export of ICT goods and services in Europe, their economic linkages, and the consequences of internet usage. As a proxy of connectivity, they might contribute to the FDI attractiveness for countries. The logarithmic variable ln_IT_{it} includes a sum of ICT goods and services exported by the country *i* at time *t*. The logarithmic variable $ln\_Internet_{it}$ covers the individuals who have used the Internet from the country *i* at time *t*. The idea is that connectivity, boosting ICT exports, and providing penetration of broadband Internet, will cause an increase in FDI flows for Europe.

Prospective EU member countries (Ukraine, Moldova, Georgia, and the Western Balkans) have experienced a substantial political and economic transformation in the last few years. Policy stability (*Policy_stab*$_{ij}$) related to these countries is also included as an influenced FDI determinant.

Table 1 reports the descriptive statistics for the dependent and the independent variables for the entire sample during the 2000-2020 period.

Table 1. Descriptive statistic

	mean	median	min	max	Std. dev.	skewness	kurtosis
ln_FDI	8.467636	8.403446	0.91	13.57963	2.364707	-.985705	5.229275
ln_GDP_PC	9.704209	9.831755	7.27	11.89095	1.403218	-3.207466	22.49464
t_{it}	1.034698	.8686053	0	3.162838	.547226	1.625668	6.541312
EU	.6528822	1	0	1	.4763522	-.6422899	1.412536
EU_AA	.2017544	0	0	1	.4015615	1.486361	3.209269
ln_OFDI_CH	10.78038	11.09974	8.978896	12.27102	.9845134	-.3283369	1.814672
Policy_stb	.4616355	.58989	-2.139184	1.760102	.6951269	-.8716088	3.682175
ln_IT	2.29663	2.39168	-1.609438	4.191584	.963496	-1.528542	7.412652
ln_Internet	3.669401	4.114541	-2.170703	4.593325	1.140538	-2.237515	7.712326

Source: Author's calculations with statistical software for data science

As seen in Table 1, the average natural logarithmic form FDI is 8.47 and its minimum and maximum values are 0.91 and 13.58, respectively. The variables *ln_FDI, ln_GDP_PC,* and *ln_Internet* have a relatively high variability that indicates greater heterogeneity. Despite *ln_FDI, ln_GDP_PC, ln_OFDI_CH, ln_IT,* and *ln_Internet* being log-transformed, their skewness values are negative. A skew to the left might be explained by the fact that initial data series (FDI, GDP per capita) do not approximate the log-normal distribution. A kurtosis of *ln_FDI, ln_GDP_PC,* and t_{ij} indicates a sharp peak with heavy tails closer to the mean(leptokurtic). However, the mean and median of *ln_FDI, ln_GDP_PC,* and t_{ij} are close, this supports that the selected data sets have a symmetrical distribution.

The Pearson correlation matrix of variables is presented in Table A2 in Appendix A. Table A2 reports the significant positive correlations between FDI and GDP per capita, EU integration, policy stability, digital infrastructure, and Chinese FDI outflows. The magnitude of the Pearson correlation coefficient between FDI inflows and trade costs as a proxy of connectivity determines the moderate negative correlation that is consistent with our hypotheses and the literature on FDI and trade. All correlation coefficients between the variables are between 0.3 and 0.7, which suggests that the variables are large and quite strongly correlated for consistent empirical analysis.

Although FDI has been growing over the last 20 years in Europe, as seen in Section 3, its dynamics have exhibited significant variations. This is especially true for FDI flows to the countries with high geopolitical risks. It may take time for investors to become familiar with the culture, institutional structure, risks, and preferences that prevail in a country. Since FDI inflows show a dynamic process in which past investment experience serves as a predictor of future investment paths, improving our specification, we include the lag variable of the dependent variable.

While most of the countries in our sample have a lot in common, namely EU membership or the intention to be part of the EU, there are remarkable differences between them in the level of economic development, pattern in trade, and policy stability. Even with scaling variables with GDP, these differences may create heterogeneity in the effects of FDI determinants in European countries. To address these problems, we impose the following model:

$$ln\_FDI_{it} = \beta_1 ln\_FDI_{i,t-1} + \beta_2 ln\_GDP\_PC_{it} + \beta_3 t_t\_CH\_NEW + \beta_4 t_t\_EU\_NEW + \beta_5 t_t\_EU\_WB + \beta_6 t_t\_CH\_WB + \beta_7 EU_{it} + \beta_8 EU\_AA_{it} + \beta_9 ln\_OFDI\_CH_{it} + \beta_{10} Policy\_stab_{it} + \beta_{11} Policy\_stab_{it} * EU\_AA + \beta_{12} ln\_IT_{it} + \beta_{13} ln\_Internet_{it} + u_{it} \quad (2)$$

where, besides variables from Model (1),$ln_FDI_{i,t-1}$is a lag variable of FDI inflows to country i at time t, $t_t\_CH\_NEW$, $t_t\_EU\_NEW$, $t_t\_EU\_WB$, $t_t\_CH\_WB$ are disaggregated subregional indices of trade costs, and $Policy\_stab_{it} * EU\_AA$ is an interaction term between the variable of policy stability ($Policy\_stab_{it}$) and a dummy variable of EU candidacy (EU_AA).

As seen from Model (2), to control for unobserved heterogeneities, we first assume that the impact of connectivity between different countries and subregions and their European (EU) and non-European partners (China) on FDI inflows is varied. For this, we suggest disaggregating a trade cost index (t_{it}) into four following groups:

- average trade costs between the Western Balkans and the European Union ($t_t\_EU\_WB$);
- average trade costs between the new EU candidates and applicants and the European Union ($t_t\_EU\_NEW$);
- average trade costs between the Western Balkans and China ($t_t\_CH\_WB$);
- average trade costs between the new EU candidates and applicants and China ($t_t\_CH\_NEW$).

Second, the issue of political stability is especially relevant for the countries of the Western Balkans, Ukraine, Moldova and Georgia. To distinguish between more stable and less politically stable European countries, we create a variable *Policy_stbit*EU_AA*, which is the interaction term between the policy stability ($Policy\_stab_{it}$) and a dummy variable of EU candidacy (*EU_AA*). Finally, to control for time-dependence and heterogeneity, we impose special estimation strategy and produce a series of empirical applications.

3.2. Empirical analysis and estimation strategy

In order to find an appropriate estimator, first, we check our panel dataset for heteroskedasticity and for first-order autocorrelation. Since we detected the presence of heteroskedasticity and autocorrelation in our sample (Table A3 in Appendix A), the Pooled OLS regression cannot be employed. Ignoring this heterogeneity among cross-sections may yield inconsistent coefficient estimations.

The main approach to deal with serial correlation is by adjusting standard errors in models to take into account autocorrelation. But, later, this conditional option does not allow to implement the usual Hausman fixed-vs.-random effects test. Thus, to correct heteroskedasticity and the correlation in our panel, where N is greater than T, we employ panel corrected standard errors (PCSE) in Table 2.

However, PCSE does not control for time-invariant unobserved individual characteristics that can be correlated with our independent variables. For this, next, we apply a static panel data analysis.

To decide between the fixed effects (FE) model and the random effects (RE) model, we perform the Hausman test (Table A4 in Appendix A). From the results, we conclude that the FE estimator is efficient for Model 1, while the RE estimator is efficient for Model 2. More specifically, under the current specification of Model 1, our initial hypothesis that the individual-level effects are adequately modelled by a random-effects model is resoundingly rejected. The FE estimator assumes the country-specific effect is correlated with the regressors while in RE the country-specific effect is idiosyncratic. The estimated effects on FDI for Model 1 and Model 2 are presented in Table 2.

Moreover, drivers of FDI connectivity also have to rely on between-panel (rather than within-panel) variation, and the use of country-fixed effects (or within-transformation) would lead to a loss of essential relevant information. In a globalized world, the connectivity of one country affects others, especially in Europe, between the EU and its neighbours. Thus, as a next step, our panel regression was checked for the presence of cross-sectional dependence (Table A5 in Appendix A). Cross-sectional dependence here may also arise when countries respond to common shocks from the financial crisis or the pandemic. The results show enough evidence to reject H0 of cross-sectional independence.

Cross-sectional dependence tests are often conducted in conjunction with tests for the direction of Granger causality. In our case, we employ the test to uncover the causal relationship between FDI and GDP per capita since multinational firms can contribute to host countries' income through production, labour cost, or technology transfers. The results (Table A6 in Appendix A) indicated that there is no causal relationship between the foreign direct investment series and the GDP per capita, but the GDP per capita causes FDI inflows in Europe for the period under investigation. Because the causal link between FDI and GDP is not bidirectional, our estimates are likely to provide unbiased results.

Cross-sectional dependence often results in standard panel unit roots. Since cross-sectional dependence is diagnosed in our panel, we employ non-standard unit root tests. The results for the dependent variable and one of the independent variables (*ln_GDP_PC)* are presented in Table A7 in Appendix A. After testing all variables, we conclude that the dependent variable is stationary, but the most independent variables are integrated of order I(1),

To verify the existence of the long-run link between variables, we test all panels for cointegration (Table A8 in Appendix A). It is observed that cointegration exists in the estimated models.

The presence of cross-sectional dependence, cointegration and problems of endogeneity in the panel dataset requires the implementation of a suitable regression method. Static panel econometric techniques only offer partial solutions. The mean group (MG) and the common correlated effects (CCE) estimators consider the heterogeneity and the cross-sectional dependence but these methods require separate time-series regressions for each cross-section; they are only suitable if the time dimension is large enough, which is not the case in our sample. Perhaps, when N is large, and T is fixed, cross-section dependence is mainly seen as weak and more problematic for macro panels with long time series. That means the coefficients of our estimates are asymptotically unbiased, and dependence remains in the residuals.

In addition to cross-country heterogeneity, FDI is a dynamic process in which international investors tend to invest more in countries with previous experiences. For this reason, we consider the dynamic nature of FDI by including the lagged variables in Model 2. The generalized method of moments (GMM) is usually applicable in this situation.

For a small sample, the Arellano and Bond (1991) difference GMM estimator could be employed. Since our data are nonstationary, the system GMM estimator is possibly inconsistent. Indeed, while initial levels of the series of the FDI flows are stationary, GDP and trade costs among countries deviate systematically from their long-run value. To avoid problems with the estimation of the two-step GMM weighting matrix, we employ the difference GMM estimator here.

While existing empirical approaches tend to have some difficulties with unbalanced panel data, to estimate the models, we use a new dynamic panel data GMM model with the new command *xtdpdgmm* (Kripfganz, 2020). Since Model 2 is dynamic (with a lagged dependent variable), there is no risk of a spurious regression problem even if the regressors are nonstationary. The GMM estimates are reported in Table 2, and the results are compared with alternative PCSE and FE/RE methods, confirming the higher predictive power of the proposed approach (Table 2).

The diagnostic of the GMM model is tested by the Sargan and Arellano-Bond (AR) statistics. The Arellano-Bond test verifies the autocorrelation in the GMM model in the form of the first order differentiation. The Sargan test determines the suitability of the tool variables in the GMM model.

Test results (Table 2) indicate that the one-step GMM model specification is adequate with test (AR) for autocorrelation of the first-differenced residuals and the J-statistic test (SH) for the validity of the overidentifying restrictions. H0 for no autocorrelation of order one, AR (1), was rejected and H0 for no autocorrelation of order two, AR (2), was not rejected for all measures. This is required as the differenced model specifications with a lagged dependent variable serving as part of the explanatory variables set will, by design, have first-order correlation, but not second-order.

The Sargan tests the null hypothesis (H0) that the tool variable is exogenous, meaning it does not correlate with the error of the model. H0 was not rejected, and all p-values are within the suggested range (0.1–0.2), confirming that the instruments, as a group, appear exogenous. Hence, the diagnostics tests confirm the model's validity.

4. Empirical results

As seen in Table 2, both model specifications (Model 1 and Model 2) have nearly the same explanatory power. Namely, the chosen independent variables have the same impact directions, except for EU membership and Chinese FDI outflows, which was originally envisaged.

Most importantly, the hypothesis that with higher connectivity, FDI inflows to the region increase and European integration is strengthened, is accepted here. The empirical analysis shows that both aggregate trade costs of each country to the rest of the world (Model 1) and disaggregate trade costs within and between subregions (Model 2) determinate the FDI inflows in Europe.

The FDI coefficient in lag 1 (*L.ln_FDI*) is statistically significant at the 1% level with the expected positive sign in both models (columns 3 and 6) that suggests a dynamic nature of FDI activity.

Table 2. The estimated effects on FDI

z	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Specification		Model 1			Model 2	
Dependent variable		ln_FDI			ln_FDI	
Estimator	PCSE_1	FE	GMM_1	PCSE_2	RE	GMM_2
L.ln_FDI			0.2032			0.1951
			(0.0276)**			(0.0255)**
ln_GDP_PC	0.4349	-0.0932	-0.6070	0.2389	-0.1477	-0.6857
	(0.1917)*	(0.0817)	(0.1272)**	(0.2069)	(0.0816)$^{+}$	(0.0676)**
t_{it}	-0.6853	0.2991	0.8165			
	(0.2176)**	(0.1603)$^{+}$	(0.3407)*			
EU	1.2266	-0.4345	2.7870	-0.0906	-0.3290	-0.0697
	(0.4966)*	(0.3785)	(1.1558)*	(0.5864)	(0.4637)	(0.3968)

EU_AA	0.3577	-0.2585	1.5646	-0.5401	-0.3382	-0.8074
	(0.3609)	(0.2522)	(0.7829)*	(0.4946)	(0.2842)	(0.3124)**
ln_OFDI_CH	-0.3665	0.0192	-0.1284	0.1358	0.3786	0.4852
	(0.1631)*	(0.0780)	(0.0667)$^{+}$	(0.2020)	(0.1074)**	(0.1360)**
Policy_stb	-0.6321	0.6127	-0.0899	-0.3308	0.3411	0.2088
	(0.2582)*	(0.1806)**	(0.1900)	(0.2811)	(0.1959)$^{+}$	(0.1288)
ln_IT	0.7958	0.7494	0.6043	0.7101	0.7090	0.4183
	(0.1260)**	(0.0846)**	(0.1589)**	(0.1073)**	(0.0825)**	(0.1764)*
ln_Internet	0.1695	0.2982	0.1796	0.1691	0.2520	0.1888
	(0.2225)	(0.0814)**	(0.0493)**	(0.2195)	(0.0811)**	(0.0353)**
t_{it}_CH_NEW				-16.6409	-18.8991	-12.3205
				(4.6120)**	(3.9730)**	(3.2360)**
t_{it}_EU_NEW				26.6021	31.4052	21.8127
				(7.1912)**	(6.0015)**	(6.0946)**
t_{it}_EU_WB				2.8209	3.7680	3.2322
				(0.7837)**	(0.6495)**	(0.5226)**
t_{it}_CH_WB				-1.0789	-0.9895	-0.4116
				(0.2159)**	(0.2045)**	(0.1788)*
Policy_stb#EU_AA				-0.5581	-0.1776	-0.5394
				(0.3068)$^{+}$	(0.2868)	(0.2896)$^{+}$
_cons	5.7834	5.9033	8.8006	0.9254	0.7650	4.3563
	(2.7275)*	(0.8289)**	(0.7598)**	(2.6792)	(1.1414)	(1.0590)**
N	745	745	675	745	745	675
r2	0.4176	0.1982		0.4606		
			Model diagnostics (p-values)			
1st order autocorrelation			0.0005			0.0002
2nd order autocorrelation			0.0977			0.1164
Sargan test			0.1897			0.1619

Note: Standard errors in parentheses $^{+}p< 0.10$, $^{*}p< .05$, $^{**}p< .01$.
Source: Author's calculations with statistical software for data science

GDP per capita (*ln_GDP_PC*), as a level of economic development and proxy of market size, is one of the most important FDI determinants. Empirical papers (Asiedu, 2002; Kaushal, 2021) examine this relationship and argue that higher income could attract more FDI inflows to the host countries. In our case (columns 2-3 and columns 5-6 in Table 2), by contrast, the coefficient of GDP per capita is negative, suggesting that a lower GDP per capita implies better prospects for FDI in the recipient country. Perhaps, for the sample with different income levels, EU candidates (the Western Balkans, Turkey) and the new EU candidates and applicants (Ukraine, Moldova, and Georgia), investors see more potential for FDI activity. In regional markets, such as the EU, investors would shift to less costly markets, driven, for instance, by the lower labour cost and then oriented towards exports. This in turn may lead to more innovation and greater productivity. This is also evident from the studies by Cicak *et al.* (2015) or Bruno *et al.* (2020) on the negative relationship between country income levels and FDI in the economies of Central and Eastern Europe.

Connectivity, through trade costs(t_{it}), has, as expected, become a defining feature of the investment activity in the selected countries. In line with the literature (Cardamone and Scoppola, 2012; Ghodsi, 2019) the impact of trade costs(t_{it})on FDI has complex mixed results (Model 1). Namely, by using PCSE (column 1), results confirm the negatively significant impact of trade costs on FDI inflows at the 5% significance level; however, when using a panel data analysis (column 2 and column 3), this impact became positive.

As in the theory, high trade costs(t_{it}) increase horizontal FDI, when a firm establishes local production through direct investment in the host country in order to jump a tariff on cross-border exports into the market. However, as seen in Section 3, since the 2000s, trade costs and investment frictions in Europe have been reduced. So, with current low or no tariffs, investors establish some parts of their production activities in other countries, where production and trade costs are relatively smaller, for instance, in Poland or Ukraine. Consequently, a drop-in trade costs leads to higher vertical FDI (column 1 in Model 1). The knowledge-capital model incorporates both horizontal and vertical motivations with low trade costs. Finally, since Europe is an ideal platform location to serve the entire regional market at the lowest overall cost, non-European countries could invest in the European countries to produce for sales primarily to third countries (export-platform FDI).

Disaggregating trade cost indices and comparing the estimates between two models provide further insights. As seen from Model 2, in all estimations (columns 4-6), the impact of subregional trade costs between the EU and the new EU candidates and applicants (t_{it}*_EU_NEW*) is significant and positive. This suggests that FDI inflows are mostly horizontal FDI, indicating 'tariff jumping' motives, as with the elimination of tariffs when the AA came into force, FDI inflows also declined. At the same time, trade costs are bilateral, meaning that higher trade costs and investment from host countries, such as Ukraine or Moldova, could lead to lower FDI inflows there.

By analogy, the impact of subregional trade costs between the EU and the Western Balkans (t_{it}*_EU_WB*) is significant and positive (columns 4-6 in Model 2). However, in addition to the horizontal motive, this suggests that when, through export-platform FDI, the entire production process takes place in one of the Western Balkan countries, trade barriers imposed by a third country increase trade costs, reduce exports, and boost FDI to the region.

The empirical results from the PCSE, RE, and GMM methods (columns 4-6 in Model 2) confirm that increases in trade costs between the new EU candidates and China (t_{it}*_CH_NEW*) and between the Western Balkans and China (t_{it}*_CH_WB*) negatively affected FDI flows to these subregions at a 1% statistical significance level. Negative coefficients of both indices indicate that FDI inflows between these countries are more vertical FDI. This is also some evidence of vertical export-platform FDI, where the goods are produced in the last stages of production in these countries and then sold on the EU market rather than being exported back to China. However, from country-level data, findings might be biased.

Differences in the magnitude of the trade cost indices within and between subregions (Model 1 and Model 2) and their partners allow verifying whether the foreign direct investment in Europe is likely to be more affected by intra-European or extra-European connectivity. As seen in Section 3, despite the majority of inflows to Europe in the 2010s coming from the EU developed countries, Chinese investment in the Western Balkans and some of the new EU candidates has doubled. Indeed, columns (5)-(6) show the positive impact of global Chinese FDI outflow (*ln_OFDI_CH*) on the FDI flows in Europe. The estimated coefficient suggests that a 1-percent increase in China's net outflow of FDI is associated with about 0.49-percent increase in the FDI inflows in Europe (column 6). The estimates are also robust across specifications.

To tease out the effect of trade costs, it is essential to find out the effect of EU integration. In line with the literature, the estimation results in Model 1 present a positive, significant and sizable effect of the EU on FDI inflows. It confirms our hypothesis that enhanced connectivity and reduced trade costs have grown in tandem with European membership (*EU*) and Association Agreements (*EU_AA*). However, using the difference GMM method in Model 2, the impact of EU membership (*EU*) on attaching FDI in the region is not statistically significant (column 6), confirming that EU enlargement was determined perhaps more powerfully by trade rather than FDI. By contrast, the coefficient of the *EU_AA* variable is significant and implies that the FDI inflows in the Western Balkans, Turkey, Ukraine, Moldova, and Georgia with Association Agreements are higher than without such an agreement. The negative sign of the *EU_AA* variable (column 6) can be driven by the fact that these countries benefit more from free-trade under European Agreements, for instance, the Western Balkans are more strongly dependent on exports to the EU. Overall, enhancing the integration within Europe, EU membership and Association Agreements turn out to be a highly significant determinant of FDI and trade between both European and non-European partners. Estimates of the impact of EU membership and EU candidacy on FDI flows in Europe are mixed but in line with recent literature (Bruno *et al.*, 2020; Grieveson *et al.*, 2021; Welfens and Baier, 2018).

The flows of FDI in Europe strongly depend on political stability (*Policy_stb*) in the region (columns 1-2 and 5-6), especially among EU candidates and the new applicants *(Policy_stb# EU_AA).* In particular, political stability (*Policy_stb*) has a positive impact on attracting FDI inflows at the 5% statistically significant level by the FE method (column 2), suggesting that more politically stable countries attract more FDI. Significant but negative sign of *Policy_stb# EU_AA*in Model 2shows that the variables are cointegrated, indicating that there is a long run theoretical relationship between them. Indeed, prospective EU member countries (Ukraine, Moldova, Georgia, and the Western Balkans) have experienced a substantial political and economic transformation during the last few years.

Information and communication technology and the Internet (*ln_IT*, *ln_Internet*) help to lower trade costs and hence expand countries' trade and FDI flows. In fact, all EU 27 economies, except Czechia and the Slovak Republic, recorded trade deficits in the ICT sector. Increasing export-platform FDI in the IT sector has been a major determinant of attractiveness and competitiveness in Europe.

Conclusion and policy implications

Connectivity across Europe matters since the EU's economic and political influence in the region might be as effective as its trade and investment connections to partners stronger. European FDI and trade connectivity, therefore, holds the potential to enhance economic growth for each country. However, the literature about connectivity as an indicator of economic cooperation or its effects on trade and FDI is more ambiguous. The paper contributes to the existing literature by indicating connectivity as a variable linked to European integration, trade costs, and FDI; and constructing FDI estimated model with connectivity as an explanatory factor for the pattern of FDI flows in Europe.

This paper uses a panel data approach for 39 countries over 2000-2020 to verify the connectivity among the economic and institutional factors affecting the FDI flows within Europe versus the European and non-European countries (focus on China). The novelty of our approach is the inclusion of all countries that have or will soon receive EU membership in the sample. Based on the applied international trade literature, connectivity is measured via international trade costs.

To investigate whether the foreign direct investment in Europe is likely to be more affected by intra-European or extra-European connectivity and differentiate its impacts between the EU, Western Balkans, and new EU candidates and applicants (Ukraine, Moldova, and Georgia), we first consider average aggregate trade cost indices for each country and Europe and China as a whole and then distinguish between indices for partners from the subregions. A relatively high drop in trade costs between the Western Balkans and the EU (-45%) over the period 2000-2020 indicates a high level of integration within Europe. But the decline (-35%) in trade costs between the EU and China over the same time points to integration with non-EU partners.

The primary analysis confirmed causality between connectivity and FDI: while trade costs between countries drift gradually over time, FDI growth for all selected countries progressively increases over the entire period. In addition, the Granger Causality test indicated that there is no causal relationship between the foreign direct investment series and the GDP per capita, but that the GDP per capita causes FDI inflows in Europe for the investigated period.

The empirical results from the PCSE, FE/RE, and GMM methods suggest the hypothesis that with higher connectivity, FDI inflows to the region increase and

European integration is strengthened. Both aggregate trade costs of each country to the rest of the world and disaggregate trade costs within and between subregions determine the FDI inflows in Europe. It confirms our hypothesis that reduced trade costs affect FDI in tandem with EU membership (EU) and Association Agreements. In the paper, we have also verified that connectivity has sharply increased the prospects of European integration, which in turn has facilitated both trade and FDI in Ukraine, Moldova, and Georgia. The flows of FDI in Europe highly depend on the political stability in the region.

Moreover, when trade and FDI activities between non-European partners (China) and Western Balkans and the new EU candidates are restricted by increasing trade costs or investment regulation, there are more motivations for the EU to invest in the subregions.

Policy pressures, geopolitical risks, and economic cooperation will boost European regional connectivity and, later, a shift towards more intraregional FDI. To date, trade and FDI connectivity are still more global than regional. The results obtained are of particular importance for the public policy decision makers, as the changes in FDI determinants require the adaptation of public policies in the selected countries.

References

Adedoyin, F.F., Bekun, F.V., Driha, O.M. and Balsalobre-Lorente, D. (2020), The effects of air transportation, energy, ICT and FDI on economic growth in the industry 4.0 era: Evidence from the United States, *Technological Forecasting & Social Change*, 160, 120297. https://doi.org/10.1016/j.techfore.2020.120297

Anderson, J.E. and Wincoop, E. (2004), Trade Costs, *Journal of Economic Literature*, 42(3), pp. 691-751. https://doi.org/10.1257/0022051042177649

Anderson, J.E., Larch, M. and Yotov, Y.V. (2019), Trade and investment in the global economy: A multi-country dynamic analysis, *European Economic Review*, 120, 103311. https://doi.org/10.1016/j.euroecorev.2019.103311

Arvis, J.-F. and Shepherd, B. (2011), The Air Connectivity Index: Measuring Integration in the Global Air Transport Network, *Policy Research working paper*, WPS 5722, World Bank (retrieved from https://openknowledge.worldbank.org/handle/10986/3486).

Arvis, J.-F., Duval, Y., Shepherd, B. and Utoktham, Ch. (2016), Trade Costs in the Developing World: 1996 - 2010, *World Trade Review*, 15(3), pp. 451-474. http://doi.org/:10.1017/S147474561500052X

Arellano, M. and Bond, S. (1991), Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *The Review of Economic Studies*, 58(2), pp. 277-297. https://doi.org/10.2307/2297968

Asiedu, E. (2002), On the Determinants of Foreign Direct Investment to Developing Countries: is Africa Different, *World Development*, 30(1), pp. 107-119. https://doi.org/10.1016/S0305-750X(01)0100-0

Asiedu, E. (2006), Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability, *The WorldEconomy*, 29(1), pp. 63-77. https://doi.org/10.1111/j.1467-9701.2006.00758.x

Bailey, N. (2018), Exploring the relationship between institutional factors and FDI attractiveness: A meta-analytic review, *International Business Review*, 27(1), pp. 139-148. https://doi.org/10.1016/j.ibusrev.2017.05.012

Bakar, N., Che Mat, C.H. and Harun, M. (2012), The Impact of Infrastructure on Foreign Direct Investment: The Case of Malaysia, *Procedia Social and Behavioral Sciences*, 65, pp. 205-211. https://doi.org/10.1016/j.sbspro.2012.11.112

Beltramo, T. (2010), Changes in Bilateral Trade Costs between European Union Member States and Major Trading Partners: An Empirical Analysis from 1989 - 2006, *MPRA Paper*, 24259, University Library of Munich, Germany.

Bergstrand, J. and Egger, P. (2007), A Knowledge-and-Physical-Capital Model of International Trade Flows, Foreign Direct Investment, and Multinational Enterprises, *Journal of International Economics*, 73(2), pp. 278-308. https://doi.org/10.1016/j.jinteco.2007.03.004

Bevan, A. and Estrin, S. (2004), Foreign investment location and institutional development in transition economies, *International Business Review*, 13(1), pp. 43-64. https://doi.org/10.1016/j.ibusrev.2003.05.005

Blonigen, B.A. and Piger, J. (2014), Determinants of foreign direct investment, *Canadian Journal of Economics, Canadian Economics Association*, 47(3), pp. 775-812, https://doi.org/10.1111/caje.12091

Bruno, R.L., Campos, N.F. and Estrin, S. (2021), The effect on foreign direct investment of membership in the European Union, *JCMS: Journal of Common Market Studies*, 59(4), pp. 802-821. https://doi.org/10.1111/jcms.13131

Buchan, N., Fatas, E. and Grimalda, G. (2012), Connectivity and Cooperation, in: Croson, R. and Bolton, G. (Eds.), *The Oxford Handbook of Economic Conflict Resolution*, Oxford: Oxford University Press, pp. 155-182.

Canh, N., Phuc, Binh, N.,Thanh, S.D. and Schinckus, C. (2020), Determinants of foreign direct investment inflows: The role of economic policy uncertainty, *International Economics*, 161(C), pp. 159-172. https://doi.org/10.1016/j.inteco.2019.11.012

Cardamone, P. and Scoppola, M. (2012), *Trade costs and the pattern of Foreign Direct Investment: evidence from five EU countries*, 2012 First Congress, June 4-5, 2012, Trento, Italy 123993, Italian Association of Agricultural and Applied Economics (AIEAA). https://doi.org/10.22004/ag.econ.123993

Carr, D.L., Markusen, J.R. and Maskus, K.E. (2001), Estimating the Knowledge-Capital Model of the Multinational Enterprise, *The American Economic Review*, 91(3), pp. 693-708. https://doi.org/10.1257/aer.91.3.693

Cicak, K. and Soric, P. (2015), The Interrelationship of FDI and GDP in European Transition Countries, *International Journal of Management Science and Business Administration*, 1(4), pp. 41-58.

Chen, M.X. and Lin, C. (2018), Foreign Investment across the Belt and Road: Patterns, Determinants, and effects, *Policy Research Working Paper*, 8607, World Bank (retrieved from https://openknowledge.worldbank.org/handle/10986/30577).

Chen, N. and Novy, D. (2022), Gravity and heterogeneous trade cost elasticities, *The Economic Journal*, 132(644), pp. 1349-1377. https://doi.org/10.1093/ej/ueab067

Derudder, B., Liu, X. and Kunaka, C. (2018), Connectivity Along Overland Corridors of the Belt and Road Initiative, *MTI Global Practice Discussion Paper*, 6, World Bank, Washington, DC (retrieved from https://openknowledge.worldbank.org/handle/10986/30609).

Duval, Y. and Utoktham, C. (2014), Impact of Trade Facilitation on Foreign Direct Investment, *ESCAP Trade and Investment Division, TID Working Paper,* No. 04/14, 18 (retrieved from http://www.unescap.org/publications).

Ercegovac, D. and Pucar, E.B. (2022), The nexus between FDI and external balance in selected Emerging European Economies - a panel data approach, *The Annals of the Faculty of Economics in Subotica*, 58(47), pp. 147-164. https://doi.org/10.5937/AnEkSub2247147E

European Commission (2021), *First Annual Report on the screening of foreign direct investments into the Union*, SWD (2021) 334 final (retrieved from https://trade.ec.europa.eu/doclib/docs/2021/november/tradoc_159940.pdf).

Ghodsi, M. (2019), How Do Technical Barriers to Trade Affect Foreign Direct Investment? *The Vienna Institute for International (wiiw) Working Paper*, 160 (retrieved from http://hdl.handle.net/10419/204025).

Gould, D.M., Kenett, D.Y. and Panterov, G. (2021), Multi-dimensional economic connectivity: benefits, risks, and policy implications, *International Journal of Finance and Economics*, 26(4), pp. 6110-6127. https://doi.org/10.1002/ijfe.2111

Grieveson, R., Holzner, M. and Vukšić, G. (2021), Regional Economic Cooperation in the Western Balkans: The Role of Stabilization and Association Agreements, Bilateral Investment Treaties and Free Trade Agreements in Regional Investment and Trade Flows, *Eastern European Economics*, 59(1), pp. 3-24. https://doi.org/10.1080/00128775.2020.1846130

Hunady, J. and Orviska, M. (2014), Determinants of Foreign Direct Investment in EU Countries - Do Corporate Taxes Really Matter?, *Procedia Economics and Finance*, 12, pp. 243 - 250. https://doi.org/10.1016/S2212-5671(14)00341-4

Jirasavetakul, L. and Rahman, J. (2018), Foreign Direct Investment in New Member States of the EU and Western Balkans: Taking Stock and Assessing Prospects, *IMF Working Papers*, 187, pp. 1-37.

Kaushal, L.A. (2021), Impact of institutional and regulatory quality on FDI inflow: case of a developing Indian economy, *Cogent Economics & Finance*, 9(1), 1985201, https://doi.org/10.1080/23322039.2021.1985201

Kaya, A. and Haan, J. (2022), Capital flows, EU integration and the global financial crisis: an empirical analysis, *Journal of Applied Economics*, 25(1), pp. 1025-1049, https://doi.org/10.1080/15140326.2022.2099726

Kox, H.L.M. and Rojas-Romagosa, H. (2019), How trade and investment agreements affect bilateral foreign direct investment: Results from a structural gravity model, *The World Economy*, 43(12), pp. 3203-3242. https://doi.org/10.1111/twec.13002

Kratz, A., Zenglein, M.J. and Sebastian, G. (2021), *Chinese FDI in Europe 2020: Update, A report by Rhodium Group and MERICS* (retrieved from https://rhg.com/wp-content/uploads/2021/06/MERICSRhodium-GroupCOFDIUpdate2021.pdf).

Kripfganz, S. (2020), *Generalized method of moments estimation of linear dynamic panel-data models*, 2020 Stata Conference 14, Stata Users Group (retrieved from https://www.stata.com/meeting/us20/slides/us20_Kripfganz.pdf).

Ekholm, K., Forslid, R. and Markusen, J.R. (2007), Export-Platform Foreign Direct Investment, *Journal of the European Economic Association*, 5(4), pp. 776-795. https://doi.org/10.1162/JEEA.2007.5.4.776

Markusen, J.R. (2002), *Multinational Firms and the Theory of International Trade*, Cambridge, MA: MIT Press.

Novy, D. (2013), Gravity Redox: Measuring International Trade Costs with Panel Data, *Economic enquiry*, 51(1), pp. 101-121. https://doi.org/10.1111/j.1465-7295.2011.00439.x

Palit, A. (2019), Trade and economic connectivity in an age of Uncertainty: South Asia and Indo-Pacific, *Panorama Insights into Asian and European Affairs*, pp. 113-121. (retrieved from https://www.kas.de/documents/288143/6741384/panorama_trade_AmitenduPalit_TradeandEconomicConnectivityinanAgeofUncertainty_SouthAsiaandIndo-Pacific.pdf/48620d6c-c9dc-8090-9393-e37e429e29e7?t=1564644887447).

Ruta, M. (2022), The Impact of the War in Ukraine on Global Trade and Investment, *Trade, Investment and Competitiveness; Equitable Growth, Finance and Institutions Insight*, World Bank (retrieved from http://documents.worldbank.org/curated/en/099750104252216595/IDU0008eed66007300452c0beb208e8903183c39).

Samina, S., Rafique, A. and Abbas, K. (2019), Institutions and FDI: evidence from developed and developing countries, *Financial Innovation*, 5(1), pp. 1-20. https://doi.org/10.1186/s40854-019-0123-7

Vidya, C.T., Prabheesh, K.P. and Sirowa S. (2020), Is trade integration leading to regionalization? Evidence from Cross-Country Network Analysis, *Journal of Economic Integration*, 35(1), pp. 10-38, http://dx.doi.org/10.11130/jei.2020.35.1.10

Vidya, C.T. and Taghizadeh-Hesary, F. (2021), Does infrastructure facilitate trade connectivity? Evidence from the ASEAN, *Asia Europe Journal*, 19(1), pp. 51-75. https://doi.org/10.1007/s10308-021-00614-6

Welfens, P.J. and Baier, F. (2018), BREXIT and Foreign Direct Investment, *Key Issues and New Empirical Findings*, 6(2), pp. 46-67. https://doi.org/10.3390/ijfs6020046

UN Comtrade Database (2022), (retrieved from https://comtrade.un.org/data).

UNCTAD (2021), *World Investment Report*, (retrieved from https://unctad.org /en/PublicationsLibrary/wir2021_en.pdf).

UNCTAD (2022), *World Investment Report*, (retrieved from https://unctad.org/ system/files/official-document/wir2022_en.pdf).

Appendix A

Table A1. Definition of the independent variables

Independent variables	Name	Description	Unit of Account	Source
GDP per capita	ln_ GDP_PC	Gross domestic product divided by midyear population. GDP per capita, deflated by the domestic GDP deflator for each country over time; base year varies by country (in logarithmic form).	Millions of USD	World Development Indicators
Trade costs	$t_{i,t}$	Two series of trade cost indices: - individual average trade costs for each sample country (Model 1); - average aggregate trade costs between some subregions (Model 2).	Index	Own calculation based on the Novy (2013) inverse-gravity method
EU membership	EU	Sample country is EU member	0,1	European Commission website https://ec.europa.eu/info/policies/eu-enlargement_en
European Union Association Agreement	EU_AA	Sample country has Association Agreement with the EU in force	0,1	European Commission - Regular report https://www.consilium.europa.eu/en/documents-publications/treaties-agreements/
China's net outflow of FDI	$ln\_OFDI\_CH_{it}$	Chinese foreign direct investment, net outflows (in logarithmic form).	Millions of USD	World Development Indicators
Information and communication technology	ln_IT_{it}	The calculated sum of information and communication technology goods and services are exported (in logarithmic form).	% of total goods and service exports	World Bank Data
Internet users	$ln\_Internet_{it}$	Individuals using the Internet, used via a computer, mobile phone, personal digital assistant, games machine, digital TV etc. (in logarithmic form).	% of population	World Development Indicators
Political Stability	$Policy\_stab_{it}$	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.	Index	Worldwide Governance Indicators

Source: Author's representation

Table A2. Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ln_FDI	1.000								
(2) ln_GDP_PC	0.517*	1.000							
(3) t_{ij}	-0.326*	-0.258*	1.000						
(4) EU	0.514*	0.660*	-0.600*	1.000					
(5) EU_AA	-0.232*	-0.300*	0.370*	-0.689*	1.000				
(6) ln_OFDI_CH	0.082*	0.144*	-0.192*	0.216*	-0.078*	1.000			
(7) Policy_stb	0.369*	0.560*	-0.461*	0.650*	-0.308*	-0.069	1.000		
(8) ln_IT	0.494*	0.437*	-0.201*	0.443*	-0.150*	0.227*	0.452*	1.000	
(9) ln_Internet	0.424*	0.616*	-0.341*	0.576*	-0.137*	0.520*	0.416*	0.462*	1.000

Note: * shows significance at p<0.05.
Source: Author's calculations with statistical software for data science

Table A3. Results of tests for heteroskedasticity and for first-order autocorrelation in panel data

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	**Wooldridge test for autocorrelation in panel data**
Ho: Constant variance Variables: fitted values of ln_FDI chi2(1) = 104.92 Prob> chi 2 = **0.0000**	H0: no first-order autocorrelation F (1, 16) = 20.198 Prob> F = **0.0004**
Conclusion: evidence of significant differences across countries	Conclusion: autocorrelation in panel data

Source: Author's calculations with statistical software for data science

Table A4. Hausman (1978) specification test

Model 1		**Model 2**	
	Coef.		*Coef.*
Chi-square test value	120.698	Chi-square test value	3.026
P-value	**0.000**	P-value	**0.995**

Source: Author's calculations with statistical software for data science

Table A5. Average correlation coefficients & Pesaran (2004) CD test

variable	panels	CD-test	p-value
ln_FDI	38	23.22	0.000
ln_GDP_PC	38	88.24	0.000
t_{it}	38	74.82	0.000
EU	38	-	-
EU_AA	38	-	-
ln_OFDI_CH	38	121.50	0.000
Policy_stb	38	9.29	0.000
ln_IT	38	14.32	0.000
ln_Internet	38	107.96	0.000

Notes: Under the null hypothesis of cross-section-independence CD ~ N(0,1).
Source: Author's calculations with statistical software for data science

Table A6. Dumitrescu and Hurlin (2012) Granger non-causality test results

H0: ln_GDP_PC does not Granger-cause ln_FDI	H0: ln_FDI does not Granger-cause ln_GDP_PC
Lag order: 1 W-bar = 2.0829 Z-bar = 3.1571 (p-value = 0.0016) Z-bar tilde =2.2018 (p-value = **0.0277**)	Lag order: 1 W-bar = 1.8453 Z-bar = 2.4645 (p-value = 0.0137) Z-bar tilde = 1.6509 (p-value = **0.0988**)

Source: Author's calculations with statistical software for data science

Table A7. Pesaran Panel Unit Root Test with cross-sectional and first difference mean included

for *ln_FDI*				for *ln_GDP_PC*			
Deterministics chosen: constant Dynamics: lags criterion decision General to Particular based on F joint test H0 (homogeneous non-stationary): bi = 0 for all i CIPS = -2.923 N,T = (17,21)				Deterministics chosen: constant Dynamics: lags criterion decision General to Particular based on F joint test H0 (homogeneous non-stationary): bi = 0 for all i CIPS = -1.331 N,T = (17,21)			
	10%	5%	1%		10%	5%	1%
Critical values at	-2.070	-2.150	-2.320	Critical values at	-2.070	-2.150	-2.320

Source: Author's calculations with statistical software for data science

Table A8. Kao Residual Co-Integration Test

Ho: No cointegration	Number of panels = 38	
Ha: All panels are cointegrated	Avg. number of periods = 16.211	
Cointegrating vector: Same	Kernel: Bartlett	
Panel means: Included	Lags: 1.42 (Newey-West)	
Time trend: Not included	Augmented lags: 1	
AR parameter: Same		
	Statistic	p-value
Modified Dickey-Fuller t	-5.6372	0.0000
Dickey-Fuller t	-7.1175	0.0000
Augmented Dickey-Fuller t	-2.5258	0.0058
Unadjusted modified Dickey-Fuller t	-11.0552	0.0000
Unadjusted Dickey-Fuller t	-9.0993	0.0000

Source: Author's calculations with statistical software for data science