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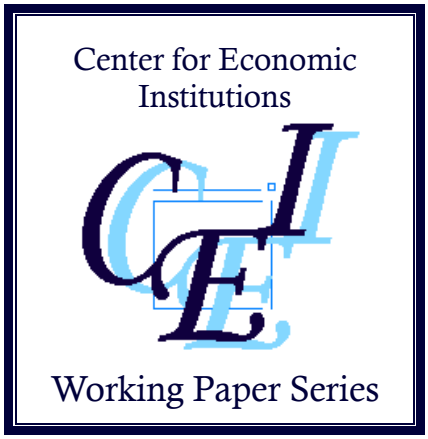

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The Determinants and Macroeconomic Impacts of Foreign Direct Investment in Transition Economies*

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Abstract: In this paper, we perform a meta-analysis of foreign direct investment in transition economies. The first part examines how transition-specific factors affect FDI in CEE and FSU countries. The latter part explores how large is the impact of FDI on macroeconomic growth in the region. The results of meta-analysis revealed that empirical results reported in previous studies present the close relationship between the progress in transition to a market economy and FDI and a positive effect of FDI on macroeconomic growth in the literature as a whole; this suggests that, in transition economies, the success of transformation towards a market-oriented system and foreign capital flow has created a kind of virtuous cycle.

Keywords: transition economies, foreign direct investment (FDI), determinants of FDI, macroeconomic impacts of FDI, meta-analysis, publication selection bias

JEL classification numbers: E22, F21, F23, F43, F62, P33

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1 Introduction

When the transition toward a market economy began in Central and Eastern Europe (CEE) and the former Soviet Union (FSU), policy makers and academic researchers widely expected that foreign direct investment (FDI) could play a significant role in the economic recovery of this region (Bangert and Poór, 1993; Carlin and Landesmann, 1997; Jensen, 2006). Nevertheless, as Sinn and Weichenrieder (1997) pointed out, "the low level of FDI has been a big disappointment" (p. 180) except for in a few reforming countries. In fact, according to **Figure 1**, the stock value of FDI in the region during the 1990s reached only 141 billion USD, and just three countries—the Czech Republic, Hungary, and Poland—represented 54%, or 76 billion USD, of the total investment.

This gloomy situation changed drastically in the 2000s. With a background of remarkable progress in systemic transformation to a market economy and high economic growth in the region, the investment of foreign capital and advancement of multinational enterprises from the old EU member countries and other advanced economies were greatly activated. It is worth stressing in this regard that, as shown in **Figure 1**, FSU countries exceeded CEE countries in the total amount of FDI inflow in the period from 2008 to 2017, and the gap between these two country groups is now remarkable. As a matter of fact, the CEE countries, including the Baltic States, received a total of 35.3 billion USD from abroad as direct investment in 2017, while the gross inflow of FDI into 12 FSU countries reached 412.3 billion USD in the same year. Consequently, as illustrated in Panel (a) of **Figure 2**, Russia became the host country of the largest FDI by the end of 2017 among 28 CEE and FSU countries, and Kazakhstan and Ukraine were also ranked in the top 10 recipients, together with six new EU member countries from Poland to Bulgaria.

Nevertheless, experts of transition economies pay attention to the trend of FDI inflow, taking into account the size of each country. In other words, when the scale of FDI is discounted by the total population, we are faced with a completely different picture from this viewpoint. In fact, as Panel (b) of **Figure 2** shows, in terms of FDI stock per capita in 2017, EU countries from Estonia to Latvia are all top five recipients of the 28 countries. In contrast, many FSU countries, including Russia and Ukraine, hold a subordinate position. The notable differences in country rank between these two panels give researchers a great hint for considering the determinants and economic impacts of FDI in CEE and FSU countries.

As pointed out above, due to unsatisfactory trends in foreign capital inflow in the 1990s combined with various technical constraints, including limited data availability and accessibility, empirical studies of FDI were far from adequate in terms of both quality and quantity throughout the first decade of transition. However, this shortage of studies was greatly ameliorated thanks to active research conducted in the 2000s and onward. Now we have a bulk of studies on this topic, and thus we may be able to draw a general picture regarding the determinants and impacts of FDI in transition economies.

With regard to the determinants of FDI, most of the researchers focus on the effect of economic reforms, among many factors to be considered. As Panel (a) of **Figure 3** suggests that the economic transition from a socialist economy to a market economy realizes more FDI in countries with a lack of savings and driving forces for the restructuring of extremely inefficient Soviet-type command economies, many researchers expect a positive correlation between FDI performance and market economy reforms related to the processes of economic transition. The assumption that progress in economic transition matters for FDI supports the view, in an implicit way, that a series of market economy reforms opens opportunities for profitable investment and motivates foreign investors to take advantage of these new business chances; that is to say, FDI inflows go beyond macroeconomic stability without arbitrary bureaucracy and require unremittingly any recipient country to create effective and sound business institutions compatible with the market economy (EBRD, 1998, pp. 81–82). In most cases, FDI studies use transition indicators of the European Bank for Reconstruction and Development (EBRD) and/or their sub-indicators by area as proxies for the extent of the economic transformation; thus, the classification reflects in principle how the EBRD categorizes the transition process into these indicators.

Some scholars, however, have been critical and skeptical of an econometric approach to measuring the FDI-inducing effect of transition from the early stage of market economy reforms; according to Myant and Drahokoupil (2012), a high score in quantified transition indicators does not necessarily imply that an efficient modern economy has been established, as the indicators are based on a narrow concept of private ownership rather than on a broader perspective of economic development that is truly indispensable for transition countries. As was acknowledged both by the EBRD, which formulated transition indicators, and Nicolas Stern, who served as the chief economist in the 1990s, the simple approach to transition indicators leaves out what seems to be important to the functioning of the market economy; although state

authorities must be sufficiently strong and well organized to secure well-regulated and efficiently operational market mechanisms, these overarching and basic considerations are reflected only in a limited way in quantifying the economic transformation process in CEE and FSU countries (Stern, 1997). Therefore, transition indicators show how far an economy has moved from a planned or command regime to a market economy; however, they do not fully indicate how and to what extent a country has worked to carry forward its market reforms. At the same time, Djankov and Murrell (2002) warned that the empirical research on transition economies paid little attention to how to make sense of transition in the wider context of economic development.

Another issue of great interest to experts is whether FDI produced a sufficient effect to encourage economic growth in the former socialist states. The economic theory, however, does not support the positive effect of FDI in this respect. In fact, according to the neoclassical growth theory, where FDI is deemed to be a pure factor input, FDI's effect on economic growth in the long term is neutral, although it does affect the national income level. This is because the growth rate will converge in the long run as the marginal product of capital diminishes its returns over time, even if the exogenous increase in capital realized in the form of capital inflow from foreign countries may temporarily expand production (Solow, 1956).

In contrast, according to the endogenous growth theory, where attention with regard to FDI is focused on its function as a delivery vehicle for transferring excellent technology, knowledge, and know-how accumulated in developed economies, FDI has a positive effect on long-term economic growth. This is true as long as it brings improvements in technology systems and/or human capital to the recipient countries through the contributions of foreign participation in management, the establishment of local subsidiaries by multinational enterprises, the outsourcing of contracts between local and foreign firms, etc. (Grossman and Helpman, 1991; Aghion and Howitt, 1997). As Borensztein et al. (1998) and Durham (2004) argued, the growth-enhancing effect of FDI largely depends on the absorption capacity of local entities (i.e., domestic firms and workers). Nevertheless, based on the assumption of high levels of education and sufficient penetration of modern rationalism in the former socialist bloc, many researchers anticipated that the possibility of such an effect would never be small in transition economies (UNECE, 2001).

However, FDI could rather negatively affect economic growth in the recipient countries if it hampers domestic investment. Indeed, Mišun and Tomšík (2002) reported that FDI crowded out domestic investment in Poland during the period of 1990

to 2000. Moreover, Kosová (2010) also found that, in the Czech Republic, the new entry of foreign-affiliated firms significantly pushed up the ex post exit rate of domestic firms from 1994 to 2001. Taking into account the weak management base and backward production technology of former socialist enterprises as compared with multinational corporations based in developed economies, it is highly likely that such negative external effects occurred in many transition economies.

Moreover, as pointed out by Easterly (1993), exemptions from corporate income tax and other FDI-friendly policies to attract foreign firms might negatively affect economic growth if these measures heavily distort incentives for domestic entities. It is a well-known fact that CEE countries launched extremely preferential policies to induce FDI in a competitive manner (Cass, 2007). Hence, we cannot rule out the possibility that what Easterly (1993) has called the "adverse incentive effect" might actually have had a negative impact on domestic firms in these states.

As mentioned above, FDI has the potential to bring about both positive and negative macroeconomic effects for the recipient countries; however, it is extremely difficult to theoretically predict the respective degree of these countervailing effects. Furthermore, as indicated in Panel (b) of **Figure 3**, the scale of FDI inflow and the economic growth rate during the transition period do not portray a definite positive correlation in a simple scatter plot as FDI and transition reforms do in Panel (a). Thus, economists examined this issue by performing a multivariate econometric analysis that considers various determinants of economic growth simultaneously. Nevertheless, as we report later, the empirical results in the extant literature regarding the causality between FDI and macroeconomic growth in CEE and the FSU are too mixed to draw a conclusion simply by looking at them.

To overcome the above research issues, in this paper, we conduct a meta-analysis of the literature that empirically examines the determinants and macroeconomic impacts of FDI in transition economies. More specifically, we asked the following questions: What do existing studies tell us about the determinants and macroeconomic impacts of FDI as a whole? What determines the differences in the empirical evidence reported in these studies? Is there any artificial bias in their publication, and, if there is, are the relevant studies sufficient for identifying the true effect beyond such a bias?

From our meta-analysis of relevant studies on transition-specific determinants of FDI in transition economies, we found that the composition of target countries in terms of both FDI donors and recipients, the data type, the estimator, and the degree of freedom bring out the heterogeneity of the empirical evidence of the original papers.

Furthermore, the results of our meta-regression analysis (MRA) reveal that the pertinent literature has provided limited empirical evidence to prove a nonzero FDI-inducing effect of economic transition, or a tiny true effect if it exists at all, partially because of the existence of publication selection bias (PSB).

With respect to the macroeconomic impacts of FDI, we confirmed that existing studies indicate a growth-enhancing effect of FDI in the region as a whole. The results of our meta-regression analysis suggest that the effect size of the reported estimates depends on study conditions. In particular, the composition of target countries and the type of FDI variable are important factors that explain the heterogeneity of the empirical results. The degree of freedom also greatly affects the magnitude of the FDI variable. We also found that the relevant studies present genuine evidence of a nonzero FDI effect on macroeconomic growth, and its true effect size is estimated to be positive but small.

The remainder of this paper is organized as follows: The next section describes the methodology of literature selection. Section 3 conducts a meta-analysis of the determinants of FDI, focusing on the effect of systemic transformation, while Section 4 examines the macroeconomic impacts of FDI. Based on the results obtained from the meta-analysis, Section 5 summarizes the major findings and concludes.

2 Methodology of literature selection

In this section, we describe our methods of selecting and coding relevant studies and for meta-analysis based on the empirical evidence collected.

In order to identify studies related to FDI in CEE and FSU countries as a base collection, we first searched the Econ-Lit and Web of Science databases for research works that had been registered in the 30 years from 1989 to 2018 that contained a combination of two terms including one from "foreign direct investment," "FDI," or "multinational enterprise" and another one from "transition economies," "Central Europe," "Eastern Europe," "the former Soviet Union," or the respective names of each CEE and FSU country. From approximately 600 studies that we found at this stage, we actually obtained nearly 400 studies, or about 67%, of the total. We also searched the references in these 400 studies and obtained about 80 additional papers. As a result, we collected nearly 480 studies.[1]

[1] The final literature search was conducted in January 2019.

These approximately 480 studies include various papers other than empirical studies on the determinants and macroeconomic impacts of FDI. Hence, as the next step, we closely examined the contents of these works and narrowed the literature list to those containing estimates that could be subjected to meta-analysis in this paper. In the next sections, we report the results of our literature selection in detail. During this process, we decided to exclude all unpublished research works. According to Doucouliagos et al. (2012), unpublished working papers might present estimates that are not final; moreover, these manuscripts are more likely to be insufficient since, at that time, they had not yet gone through the peer review process. In our judgment, the same concerns also apply to unpublished works we obtained for this study. Another reason to exclude unpublished works is that we use the quality level of each paper that we evaluate based on external indicators as a weight for a combination of statistical significance levels and as an analytical weight or a meta-independent variable for the MRA. In addition, the following facts also motivate us to take this measure: First, the number of working papers is not very large in our case. Second, these unpublished works are not heavily concentrated in recent years. The latter fact led us to decide that there is no particular concern in overlooking the latest research results due to their exclusion.

For the study in this paper, we adopt an eclectic coding rule to simultaneously mitigate the following two selection problems: One is the arbitrary-selection problem caused by data collection in which the meta-analyst selects only one estimate per study. The second is overrepresentation caused by data collection in which all estimates are taken from every study without any conditions. More specifically, we do not necessarily limit the selection to one estimate per study, but multiple estimates are collected if, and only if, we can recognize notable differences from the viewpoint of empirical methodology in at least one item of the target regions/countries, data type, regression equation, estimation period, or estimator. Hereinafter, K denotes the total number of collected estimates ($k = 1, 2, \ldots, K$). To analyze the collected estimates from selected studies using meta-analytic techniques, we follow the methodology described in Iwasaki and Tokunaga (2014).

3 Determinants of FDI in transition economies

In this section, we attempt to see the relationship between economic transition and FDI performance in the CEE and FSU regions over the past quarter century. First,

Subsection 3.1 gives an overview of the studies selected for meta-analysis. Next, Subsection 3.2 demonstrates our synthesis of the collected estimates, and Subsection 3.3 performs meta-regression analysis to explore the heterogeneity observed between studies. Finally, Subsection 3.4 assesses the publication selection bias in the relevant literature.

3.1 Overview of selected studies for meta-analysis

We will begin to give a brief review of the selected studies for a meta-analysis of the determinants of FDI in the CEE and FSU countries during the transition period. Among various key FDI-enhancing factors being discussed so far, a central preoccupation of scholars and policy makers in the region is the extent to which FDI inflow has been influenced by market economy reforms such as liberalization, enterprise restructuring, competition policy, and privatization. Some empirical works were in place by the mid-1990s, and all of these studies found a positive correlation between FDI performance and market economy reforms related to the processes of economic transition that were represented by EBRD transition indicators, among other things (Lankes and Venables, 1996; Lansbury et al., 1996; Selowsky and Martin, 1997; EBRD, 1998, Chapter 4). Then, a rapidly increasing FDI inflow in the ensuing years and the growing availability of statistical data for econometric analysis enabled researchers to accelerate their study of FDI determinants in the transition economies, a large part of which drew the conclusion that more progress in the economic transition led to greater FDI received.

In accordance with the method of literature selection described in the previous section, we selected a total of 44 studies that contain estimates suitable for our meta-analysis.[2] Note that we removed those studies that, first, do not provide empirical results in quantitative way, such as descriptive studies specifically; second, involve only one explanatory variable in simple regression models; third, adopt binary dependent variables with probit and/or logit estimators, of which the explanatory variables' effect sizes are not comparable to those of linear regression models[3]; and fourth, focus spatially limited areas or specific industrial subsectors in a host country, of which the research design seems to be fundamentally different from those of country-level studies. Finally, we trimmed our samples by eliminating some outliers that bring out quite a large inverse of standard errors of the partial correlation coefficients (PCCs).

[2] See list (a) in **Appendix 1** and **Appendix 2** for details of the selected studies.

[3] See Stanley and Doucouliagos (2012, pp. 16–17) for more details.

In the 44 selected studies, non-EU CEE countries and FSU countries, excluding the Baltics, with less opportunity to participate in the process of EU accession despite high FDI performance or potential, are moved out of the research object inter alia among the empirical studies. An exception is Croatia, which joined the EU in 2013. Derado (2013) is a good example of works driven by the perspective of a country's EU accession process (see also Deichmann, 2013). Also, recent studies try to fill the knowledge gap, focusing on the determinants of FDI location in Southeastern Europe or the Balkans (Hengel, 2011; Estrin and Uvalic, 2014; Dauti, 2015a, 2015b; Lee, 2015; Shukurov, 2016). On the whole, except for Döhrn (2000) and Jensen (2002), who do not report the composition of FDI recipients, the total number of host country observations is 541, of which 59.7% (323 observations) deal with CEE EU countries. Meanwhile, the share of non-EU CEE countries and FSU countries, excluding the three Baltic states, account for only 13.9% (75 observations) and 19.2% (104 observations), respectively.

Empirical analysis in the selected studies above covers the 23 years from 1989 to 2011 as a whole. The average estimation period of collected estimates is 10.7 years (median: 10, standard deviation: 3.9). Twenty-two studies employ the total FDI model with all FDI received from the world as a dependent variable, while 20 studies rely on the bilateral FDI model that uses an amount of FDI from a specific home country as a dependent variable. The remaining two estimate both models. We see a recent upward trend in the number of studies adopting the bilateral model, which reflects the intention of those who have been analyzing FDI determinants in general to attach more weight to the gravity model as a basic research design. Reflecting the reality that a large portion of inward FDI to CEE and FSU countries comes from advanced countries within the EU, the bilateral FDI model makes Western Europe a main target for analysis. A few advanced non-EU countries and leading emerging market economies, including those in the former socialist bloc, are also added to the list of investors in Bandelj (2002, 2008) and Estrin and Uvalic (2014).

As for data type, studies using panel data make up over 80% of the total; otherwise they employ cross-sectional data or, in only one case, rely on time series data. Some researchers were conducting empirical analyses with cross-sectional data until the mid-2000s. This is probably due to the limited availability of longitudinal data as well as the volatility of FDI inflow to the region during the first decade of transition. Next, the FDI indicators to be introduced as dependent variables on the left-hand side of regression equations can be subdivided into seven groups. The annual net FDI inflow

is the most commonly used indicator; 17 of the 44 studies count upon this type of variable. Cumulative gross FDI value or FDI stock comes next; 9 studies use these. The FDI variable chosen seems to depend both on purely technical considerations and a priori selection of the specific variables, given the research interest of each study. In the case of the first issue, when one applies published and widely used FDI datasets that are often extracted from the UNCTADStat, OECD StatExtracts, the World Economic Outlook database of the IMF, and the World Development Indicators provided by the World Bank Group, a negative value would be found. This is because these datasets express the annual net value of FDI flow or a difference between inbound FDI and outbound FDI based on the balance of payment statistics of each country. That poses a serious obstacle to performing log-transformed linear regression. In fact, we have seen a negative bilateral investment flow in CEE and FSU countries explicitly during the two financial crises of the mid-1990s and 2008−2009; in Russia, among others, "capital flight" continues to be a macroeconomic problem even now, despite its largest FDI volume received in absolute terms. Besides that, the unevenness of FDI inflow has the potential to make for noisier relationships with other flows, such as GDP, to which they are often scaled (Claessens et al., 2000). To avoid this problem, for example, Garibaldi et al. (2001) used the gross value of FDI inflow without any deduction for outflow, and Botrić and Škuflić (2006) cited the FDI stock from a direct investment position database. As for a priori selection of FDI indicators, although not often expressly stated in the papers, it is highly predictable that the authors prefer a specific FDI variable for their research design and tasks. To give an example, Overesch and Wamser (2010) argued for the conceptual advantages of the number of investments (count variable) as a result of location choice by multinational enterprises because a usual form of binary choice model (to go or not to go) is incapable of taking into account that multinational enterprises often have multiple affiliates in a host country.

Meanwhile, transition-specific explanatory variables that are incorporated into the right-hand side of regression equations can be classified according to their contents with six indicators. In most cases, the selected studies use EBRD transition indicators and/or their sub-indicators by area as proxies for the extent of the economic transformation; thus, the classification reflects in principle how the EBRD categorizes the transition process into these indicators. However, the privatization indicators stipulated herein include the large- and small-scale privatization indexes provided by the EBRD as well as other privatization-related variables, such as private sector share and privatization revenues in each country. We found that studies using these

privatization indicators as transition-specific explanatory variables are in the majority, accounting for 23 of the total 44 studies with them. This is understandable in light of the fact that by-bidding direct sales of state-owned assets was proposed as a way of privatization in CEE and FSU countries, thereby dramatically increasing FDI inflow in some cases, as symbolized by Hungary in the 1990s. Subsequently, 11 papers employ general transition indicators; those that rely on liberalization indicators, enterprise reform indicators, and competition policy indicators are in the minority (from five to seven studies for each); interestingly, 19 studies deploy other transition indicators such as trade and forex systems, the efficiency of law institutions, infrastructure reform, and financial sector reform. This last point would suggest the breadth of researchers' understanding of the economic transition or, alternatively, reflect that there is no clear consensus concerning the essence of the economic transition in the region.

3.2 Meta-synthesis

Figure 4 shows the frequency distribution of the PCC and the *t* value of the transition-related variables; the Shapiro-Wilk test rejects the null hypothesis of normality at the 1% significance level for both. As Panel (a) of this figure shows, the PCC shows a sharp-pointed distribution with a mean of 0.197 and a median of 0.160. According to Cohen's (1988) guidelines of PCC, 25.7% (46 estimates) find no practical relationship ($|r|<0.1$) between transition progress and FDI performance in CEE and FSU countries, while 50.8% (91 estimates) and the remaining 23.5% (42 estimates) report a small effect ($0.1\leq|r|\leq0.3$) and a medium or large effect ($0.3<|r|$), respectively. Meanwhile, Panel (b) of the figure tells us that the estimates of transition-related variables with respective absolute *t* values that are equal to or greater than 2.0 account for 54.7% (98 estimates) of the total.

The estimation period of each study varies significantly; thus, we could expect that this difference has a noticeable influence on empirical results. In fact, Panel (a) of **Figure 5** reveals that the effect size of the collected estimates has been decreasing over time, meaning that the correlation of economic transition and FDI would be weakened as market-oriented economic reforms continue. At the same time, Panel (b) of the figure shows that the collected estimates demonstrate a flat trend for the *t* value in chronological order; the coefficient of the average year of estimation period (*yr*) is estimated to be positive but statistically insignificant. To examine this point more strictly, we will test the influence of the estimation period on empirical results in the meta-regression analysis in the next subsection.

To consider the implications of the integration of empirical results in a more systematic way, we synthesized the collected estimates of the selected studies using the meta-synthesis methodology outlined in Iwasaki and Tokunaga (2014). **Table 1** indicates the outcome of the synthesis of the collected estimates extracted from our sample. In addition to the overall synthesis results shown on the top line, we also report individual synthesis results, focusing on differences in data types, model types, types of FDI variable, and types of transition variable, in light of the discussion in the previous subsection.

As shown in Column (a) of the table, which reports the synthesis results of the PCC, the homogeneity test rejects the null hypothesis in almost every case; thus, the synthesized effect size, $\overline{R_r}$, of the random-effects model is adopted as the reference value. The magnitude of the synthesized effect size differs remarkably between subjects of comparison. More specifically, studies that conduct a time series data analysis tend to report a much larger positive effect on FDI performance than do those performing a panel or a cross-sectional data analysis. With regard to model type, the total FDI model is highly likely to result in a greater influence of FDI determinants as compared to the bilateral FDI model. The type of FDI variable chosen seems to be essential for interpreting empirical results; studies using annual net or gross FDI inflow per capita tend to offer larger effect sizes than do others. In the case of transition-specific explanatory variables, their effect sizes are roughly classified into two groups—one for variables with comparatively larger effect sizes (indicators of general transition, liberalization, and enterprise reform), and the other for less powerful variables (competition policy, privatization, and other indicators). Remember that these results are simply compiled from the collected estimates of the original studies. In the next subsection, we will turn to this issue in a more rigorous way, so as to be more precise using multivariate meta-regression models.

Column (b) of the table shows the results of the combined *t* value. A first inspection of both tables immediately reveals not only that the combined *t* value, $\overline{T_w}$, weighted by the quality level of the study is substantially lower than the unweighted combined *t* value, $\overline{T_u}$, but also that the former falls below the 10% level in terms of its statistical significance, in some cases. These results suggest that there may be a strongly negative correlation between the quality level of the study and the reported *t* value. On the other hand, except for a few cases, the fail-safe N (*fsN*) in the right column of the tables shows a sufficiently large value. This means that, even taking into consideration the presence of unpublished studies (working papers, discussion papers, conference papers

etc.) that have been omitted from our meta-analysis, the overall research implications obtained from the selected studies herein cannot be easily dismissed.

3.3 Meta-regression analysis

Based on discussions in this section, one can foresee that the observed heterogeneous set of studies would largely affect their empirical results. In order to scrutinize this issue more carefully, we estimated meta-regression models that take either the PCC or the *t* value of a collected estimate as the dependent variable. **Table 2** lists the names, definitions, and descriptive statistics of meta-independent variables to be introduced on the right-hand side of the regression model. As this table suggests, in our MRA, we quantitatively examine whether and to what extent empirical evidence from the pertinent literature is affected by differences in the composition of target countries in terms of both FDI donors and recipients, the estimation period, the data type, the presence or absence of controlling for individual and time effects,[4] the estimator, the model type, the form of dependent variable (exact numeric value versus logarithmic value), the type of FDI variable, the type of transition variable, and the degree of freedom, as well as the quality level of the study. Note that some meta-analysis studies of general FDI determinants have, thus far, demonstrated that the empirical evidence of original papers is highly dependent on what type of FDI variable is chosen.[5]

Table 3 reports the estimation results of the MRA of heterogeneity among the selected studies for transition-specific FDI determinants. Although the weighted least squares (WLS) models are sensitive to the choice of analytical weights, many variables are significantly estimated uniformly. The coefficient of determination (R^2), which indicates the explanatory power of a model, ranges from 0.220 (Model [7]) to 0.828 (Model [4]) if we set aside Model [14] with extremely low explanatory power due to the omission of several explanatory variables in the course of the fixed-effects estimation. This is of a sufficient level, as compared to previous meta-analysis studies of FDI performance.

Based on the estimation results of two sets of MRA, we find that a number of coded characteristics of the selected studies exert a statistically significant influence on their empirical evidence. In other words, the empirical results of FDI determinants

[4] We include this in our MRA because controlling for unobserved host country heterogeneity and common time effects may reduce the variation of transition-related variables (Overesch and Wamser, 2010).

[5] See de Mooij and Ederveen (2003, 2008) and Feld and Heckemeyer (2011).

are highly likely to be affected as follows: First, the empirical evidence of original papers would be affected by differences in the composition of target countries. While studies with more non-EU CEE countries as FDI donors are conducive to larger effect sizes and higher statistical significances, studies with more non-EU advanced countries as FDI suppliers report smaller effect sizes and lower statistical significances.

Second, as suggested by the quantitative synthesis of the empirical results reported in **Table 1**, a notable result of the MRA herein is the large difference between the panel data and the time series data. Estimates of the time series data analysis, i.e., single country studies, are larger by approximately 0.6–0.7 in terms of the PCC relative to the panel data analysis as a benchmark. At the same time, studies using cross-sectional data report statistically significant lower estimates for both PCCs and *t* values as compared to panel data studies. Although an overview of the original papers would tempt us to conclude that researchers were obliged to work with cross-sectional data during the early years of transition, mainly due to the unavailability and/or the incredibility of region-wide datasets,[6] we examined whether the estimation period was associated with increased FDI performance and found no relationship between them in the MRA. This provided evidence that the effect is entirely attributable to differences in the data type.

Third, the choice of estimator also greatly affects the estimation results. As compared to the benchmark estimator, i.e., OLS, more reflective estimators, such as FE, 2SLS, and GMM that pay more attention to possible biases in the estimates due to the individual effects of host target countries or to simultaneous causation between FDI performance and FDI determinants, tend to present a more conservative assessment of the effect size and statistical power. Since we can expect that there would be endogeneity between FDI performance and economic transition, this MRA result suggests that one must tackle the issue explicitly.

Fourth, it seems that the choice of FDI variable type does not cause a large variance in the effect size or the statistical significance of the FDI variables. In other words, contrary to all expectations, the difference in the type of FDI variable does not give rise to large heterogeneity among the whole set of studies. Only studies using annual gross FDI inflow as the dependent variable are likely to report smaller effect sizes and lower statistical significances of economic transition. At the same time, the choice of

[6] As is clearly shown in **Table 1**, studies that employ cross-sectional data are found mainly in the early original papers selected for our meta-analysis.

transition variable type does not bring about a large significant difference in the PCC (Panel (a) in **Table 3**). This result seems to be consistent with the previous discussion, which pointed out the homogeneous population of transition variables, partly reflecting the fact that they are largely in reference to or compiled from EBRD transition indicators/sub-indicators. It is well known that there appears to be a strong positive correlation between those variables that are devised to indicate the progress of economic reforms in CEE and FSU countries.[7] However, the choice of transition variable seems to exert a certain influence on the statistical significance, i.e., the *t* value (Panel (b) in **Table 3**). As opposed to aggregated general transition indicators, functionally segmented transition variables act to reduce the statistical power of estimates.

In addition to the above findings, **Table 3** also suggests that the degree of freedom for estimates, i.e., the number of samples, has a mild negative effect on the empirical evaluations of transition-specific FDI determinants. Accordingly, studies with larger sample sizes, ceteris paribus, tend to assign lower values to transitional factors for stimulating foreign business, thus drawing conservative conclusions concerning the causality between economic transition and FDI performance in CEE and FSU countries. Other meta-independent variables, such as the estimation period, control for individual and time effects, and, in all but a few cases, the form of dependent variables is not statistically estimated at the 10% level of significance, reflecting the fact that these characteristics do not cause heterogeneity among individual studies under our meta-analysis.

3.4 Assessment of publication selection bias

In aggregating the results of the relevant literature that examines the determinants of FDI in CEE and FSU countries, we must keep in mind that no empirical study is exempt from PSB. The objective of this final analytical section is to find the magnitude of PSB and attempt to grasp the true effect of the transition variables in question by removing the influence of PSB.

Looking at the transition-related variables in Panel (a) of **Figure 6**, if the true effect exists around zero, then the ratio of the positive-versus-negative estimates becomes 157:22, which strongly rejects the null hypothesis that the ratio is 50:50 ($z = 10.090$, p

[7] According to the IMF (2000, pp. 133–137), EBRD transition indicators and two alternatives (the liberalization index and the index of institutional quality) are highly correlated, which reflects the similarity of the concepts measured.

= 0.000); therefore, type I PSB is strongly suspected to be present in the existing literature. On the other hand, if the synthesized value of 0.166 obtained from the random-effects model reported in **Table 1** is used as an approximate value of the true effect, the collected estimates herein have a ratio of 85:94; accordingly, the null hypothesis is not rejected (z = -0.673, p = 0.749). In this case, we can see a relatively symmetric and triangular distribution of the collected estimates in the figure; thus, the possibility of type I PSB is considered to be low.

Next, looking at the Galbraith plot, we can confirm that the presence of type II PSB is highly likely in this research field. For the transition-specific variables in Panel (b) of **Figure 7**, only 71 of the 179 estimates show t values within the range of ±1.96 or two-sided critical values at the 5% significance level. This result strongly rejects the null hypothesis that the rate as a percentage of total estimations is 95% (z = 33.969, p = 0.000). Even based on the assumption that the synthesized effect size of 0.166 stands as the true effect, the corresponding result also rejects the null hypothesis that estimates in which statistics $|(\text{the } k\text{th estimate} - \text{the true effect})/\text{SE}_k|$ exceed the critical value of 1.96 account for 5% of all estimates (z = 21.623, p = 0.000). All too often, empirical papers cling to more statistically significant results and, thus, are contaminated by type II PSB. This holds true for our case.

Finally, we examined the two types of PSB and attempted to determine whether genuine empirical evidence is present by estimating the meta-regression models specially developed for this purpose. **Table 4** summarizes the results. As Panels (a) and (b) of the table show, the null hypothesis that the intercept term β_0 is equal to zero is rejected in four of five models; this supports the view that both types of PSB have thoroughly prevailed in the selected studies. At the same time, in Panel (a), the null hypothesis that the coefficient of the inverse of standard error β_1 is zero is rejected only in one of five models, meaning that genuine evidence would exist in the collected estimates in a very limited way, despite the fact that Panel (c) shows that the coefficient of the inverse of standard error β_1 is statistically significantly different from zero in all five models. Detecting the true effect of the transition-related FDI determinant seems to be difficult due to the existence of strong PSB in this field.

All things considered, we conclude that the empirical results reported in the pertinent literature that examined the FDI-inducement power of economic transition have provided limited empirical evidence to prove a nonzero FDI-inducing effect. Even if we assume a nonzero effect, its magnitude would be in the range of 0.0354 to 0.0498; this size is really small, according to the Cohen's criteria.

4 Macroeconomic impacts of FDI in transition economies

This section aims to examine the impacts of FDI inflow on macroeconomic growth in transition economies. To this end, Subsection 4.1 gives an overview of selected studies for meta-analysis. Subsection 4.2 demonstrates the synthesis of collected estimates. Subsection 4.3 performs meta-regression analysis to explore the observed heterogeneity between studies. Then, Subsection 4.4 assesses publication selection bias in the extant literature.

4.1 Overview of selected studies for meta-analysis

In accordance with the literature selection method described in Section 2, we selected a total of 31 studies that contain estimates suitable for meta-analysis of macroeconomic impacts of FDI in transition economies.[8] In the *Economic Survey of Europe 2001*, the United Nations Economic Commission for Europe pointed out that "studies of the impact of FDI on GDP in the transition economies are lacking" (UNECE, 2001, p. 204) given the background of the scarcity of time series data available for empirical analysis and poor investment results throughout the 1990s. However, this academic vacuum at the beginning of the new century has been largely filled by subsequent research efforts.

According to our survey results, Barrell and Holland (2000) was a pioneering study that empirically examined the macroeconomic effect of FDI in transition economies. They reported a positive and statistically significant correlation between FDI and the total value added per worker in the manufacturing sectors in Hungary, Poland, and the Czech Republic. Since its publication, empirical works in this study area have been published constantly, with Elmawazini et al. (2018) being the latest. However, the target countries for the 31 selected studies are heavily distorted toward a handful of nations. In fact, the total number of country observations covered in these studies is 338, of which 57.7% (195 observations) deal with the 10 CEE countries that joined the EU in either 2004 or 2007. Meanwhile, other CEE countries and FSU states, excluding the three Baltic countries, accounted for only 16.7% (57 observations) and 23.4% (79 observations), respectively. Lyroudi et al. (2004) and Apergis et al. (2008) also included Mongolia in their target countries, and Acharya and Nuriev (2016) treated five transition economies in Asia as well.

Empirical analysis in the 31 selected studies covers the 26 years from 1989 to 2014

[8] See list (b) in **Appendix 1** and **Appendix 3** for details of the selected studies.

as a whole. The average estimation period of collected estimates is 11.7 years (median: 11.5; standard deviation: 3.6). Twenty-three studies used panel data, while eight studies employed time series data. Twenty-five studies used GDP as the benchmark index for the macroeconomic variable to be introduced in the left-hand side of their respective regression models. The remaining six studies dealt with either the gross value added to the manufacturing industry, the gross industrial production, or the sectoral value added in order to measure macroeconomic growth in their target countries. As for the scale of economic growth, 10 studies adopted the level of output volume, 10 studies chose the change in output volume, eight studies used the level of productivity, and the remaining two selected the change in the productivity level.

With regard to the FDI variable, which is to be introduced together with other variables in the right-hand side of the regression models, there is more variation in the types. In fact, the FDI to GDP ratio, which is the most widely used variable type, was adopted by 10 studies. This type is followed by the annual capital inflow (nine studies), the cumulative investment value (seven studies), and the cumulative investment per capita or worker (four studies). The FDI to the total value added ratio, the FDI to the gross fixed capital formation ratio, the growth rate, and other variables were adopted by one or two studies for their empirical analyses.

From these 31 studies, we collected a total of 172 estimates (5.5 per study, on average). According to our bold classification of the empirical results of these studies, 16 studies reported positive and statistically significant macroeconomic impacts of FDI, while Mencinger (2003) took a pessimistic view of the role of FDI in macroeconomic growth with negative and significant estimates of the FDI variable. The remaining 14 studies either detected no significant macroeconomic impact of FDI or reported that the FDI variable was not statistically robust. We conjecture that the above-mentioned differences in empirical methodologies resulted in such mixed results among the relevant studies. In the following subsections, we further explore this point using the meta-analytic techniques mentioned in Iwasaki and Tokunaga (2014).

4.2 Meta-synthesis

Figure 8 illustrates a frequency distribution of the PCC and that of the t value using 172 estimates collected from the aforementioned 31 studies. As Panel (a) of this figure shows, the PCC shows a sharp-pointed distribution with a mean of 0.180 and a median of 0.173. Thus, the Shapiro-Wilk test rejects the null hypothesis of normality at the 1% significance level (V = 3.808, p = 0.001). According to Doucouliagos' (2011)

guidelines for the study field of FDI and economic growth, 26.2% (45 estimates) found no practical relationship ($|r|<0.103$) between FDI and macroeconomic growth in transition economies, while 29.7% (51 estimates), 25.6% (44 estimates), and the remaining 18.6% (32 estimates) reported a small effect ($0.103\leq|r|\leq0.214$), a medium effect ($0.214<|r|\leq0.338$), and a large effect ($0.338<|r|$), respectively. Meanwhile, as seen in Panel (b) of the same figure, the *t* value shows a skewed distribution toward the positive direction longwise with a mean of 2.311 and a median of 2.323. Accordingly, the Shapiro-Wilk normality test strongly rejects the null hypothesis (V = 11.985, p = 0.000) again. The estimates with respective absolute *t* values that are equal to or exceed the threshold of 1.96 account for 57.6% (99 estimates) of the total. Therefore, it can be said that the above 31 studies as a whole emphasize the presence of statistically significant and practically meaningful effects of FDI on macroeconomic growth in CEE and FSU countries.

The estimation period of each study varied significantly, and it is possible that this difference might have had a certain influence on the empirical results. In **Figure 9**, however, we found that the collected estimates show a flat trend in chronological order. In fact, according to the approximately straight lines drawn in this figure, the coefficient of the average year of estimation period (*yr*) is estimated to be positive but statistically insignificant for both cases of the PCC and *t* value. To examine this point more strictly, we tested the influence of estimation period on empirical results in the meta-regression analysis.

Table 5 performs synthesis of the collected estimates. In addition to the overall synthesis results shown on the top line, this table also reports results focusing on the differences in data types and benchmark indexes for and types of the macroeconomic variable, as well as the type of FDI variable in light of the discussion in the previous subsection. As shown in Column (a) of the table, which reports the synthesis results of the PCC, the homogeneity test rejects the null hypothesis in every case; thus, the synthesized effect size $\overline{R_r}$ of the random-effects model is adopted as the reference value. Here, the synthesized PCC of all studies is 0.186, with statistical significance at the 1% level. The presence of a statistically significant positive macroeconomic effect of FDI can be found in all conditions, with the only exception being a study in which the change in productivity level was adopted as a type of macroeconomic variable. However, the magnitude of the synthesized effect size remarkably differs between subjects of comparison. More specifically, studies that conducted a time series analysis tended to report a larger positive effect of FDI on macroeconomic growth than did

those performing a panel data analysis (0.280 vs. 0.163). The same applies to the relationship between the output level and change indexes (0.268 vs. 0.191) and that between cumulative investment value and other types of FDI variables (0.337 vs. 0.116–0.182).

Column (b) of **Table 5** shows the results of the combination of the *t* values. Here, we can see that the combined *t* value $\overline{T_w}$ that is weighted according to the quality level of the study is substantially lower than the unconditionally combined *t* value $\overline{T_u}$. This result suggests that there may be a strongly negative correlation between the quality level of the study and the reported *t* value. Furthermore, the *fsN* in the right column of the same table shows a sufficiently large value, except for one case. This means that, even taking into consideration the presence of unpublished working papers that have been omitted from our meta-analysis, the overall research implications obtained from the 31 selected studies cannot easily be dismissed.

4.3 Meta-regression analysis

As indicated in **Table 5**, the empirical evidence concerning the macroeconomic impact of FDI in transition economies is likely to be greatly affected by study conditions and quality. In order to scrutinize this issue more rigidly, we estimated a meta-regression model that takes either the PCC or the *t* value of a collected estimate as the dependent variable. **Table 6** lists the names, definitions, and descriptive statistics of meta-independent variables to be introduced on the right-hand side of the regression model. As this table shows, we examined whether and how empirical evidence from the existing literature is affected by differences in the composition of target countries, the estimation period, the data type, the estimator, the benchmark index/type for the macroeconomic variable, the type of FDI variable, and the degree of freedom, as well as the quality level of the study.

Table 7 reports the estimation results. As shown in the table, estimates of several meta-independent variables significantly vary with the choice of estimator. Thus, assuming that meta-independent variables that are statistically significant and have the same sign in at least four of the seven models constitute statistically robust estimation results, we indicate the following four points about factors that generate systematic differences among the empirical results regarding the macroeconomic impact of FDI in transition economies:

First, the composition of target countries has a certain influence on the estimates collected from the relevant studies. Actually, the proportion of other CEE countries is

estimated with a significant and positive sign in four of the seven models in Panel (a) of **Table 7**, suggesting that the inclusion of Croatia and non-EU CEE countries tends to produce empirical evidence with a larger effect size than those of CEE-10 EU members and FSU countries.

Second, the selection of FDI variable types is an important factor in explaining the difference between the selected studies. Namely, more positive macroeconomic effects tend to be detected in estimations in which the cumulative value or growth rate of FDI is adopted as compared to those in which the FDI to GDP ratio is taken as an independent variable. Meanwhile, the estimates reported by studies where the cumulative FDI per capita is adopted are more negative concerning the size of the FDI impact. These results strongly indicate that the choice of FDI variable is critical for empirically assessing the macroeconomic impacts of FDI into CEE and FSU countries.

Third, the degree of freedom is also an influential factor in empirical evaluations of the macroeconomic impacts of FDI in the existing literature. The square root of the degree of freedom is estimated to be robust and negative in Panel (a) of **Table 7**. In other words, when other conditions remain the same, studies with larger sample sizes tend to give lower evaluations of the magnitude of FDI's effect on growth. We surmise that more precise studies, in terms of empirical data, have a tendency to draw conservative conclusions concerning the causality between FDI and macroeconomic growth in transition economies.

Fourth, in contrast with the three factors above, the difference in the estimation period, data type, estimator, benchmark index/type of the macroeconomic variable, and quality level of the study does not significantly affect empirical results in the selected works when we control for a series of study conditions simultaneously. From Panel (b) of **Table 7**, we also found that no factor systematically influences the statistical significance of the collected estimates except for the type of FDI variable.

Overall, the findings obtained from the meta-regression analysis are noteworthy for understanding the relationship between the study conditions and empirical evidence in the existing literature on the macroeconomic impacts of FDI in transition economies.

4.4 Assessment of publication selection bias

As a final step of meta-analysis, we tested for PSB and the presence of genuine empirical evidence of the growth-enhancing effect of FDI in the selected studies.

First, we looked at a funnel plot of the collected estimates' PCCs against the respective inverse of the standard errors in **Figure 10**. This figure shows the expected

shape, which can be seen among studies of a given research subject without publication selection bias. In other words, we can see a relatively symmetrical and triangular distribution of the collected estimates in the figure if the synthesized value of 0.186 obtained from the random-effects model reported in **Table 5** is used as an approximate value of the true effect. In fact, if the true effect is assumed to be close to the synthesized value, the collected estimates are divided into a ratio of 79:93, with a value of 0.186 being the threshold; accordingly, the null hypothesis is not rejected (z = -1.068, p = 0.286). Thus, the possibility of type I PSB is considered to be low.[9]

Next, looking at the Galbraith plot in **Figure 11**, we can confirm that 73 of the 172 estimates show a t value that is within the range of ±1.96 or the two-sided critical values at the 5% significance level. This result strongly rejects the null hypothesis that the rate as a percentage of total estimations is 95% (z = 31.627, p = 0.000). Even with the assumption that the synthesized effect size of 0.186 stands as the true effect, the corresponding result also rejects the null hypothesis that estimates in which the statistic $|(\text{the } k-\text{th estimation} - \text{true effect})/SE_k|$ exceeds the critical value of 1.96 account for 5% of all estimates (z = 19.382, p = 0.000). Therefore, the presence of type II PSB is likely in this research field.

Finally, we examined the two types of PSB and the presence of genuine empirical evidence by estimating a set of meta-regression models specially developed for this purpose. **Table 8** summarizes the results. As Panel (a) of the table shows, the null hypothesis that the intercept term β_0 is equal to zero is not rejected in any of the five models, while three of the five models do not reject the same null hypotheses in Panel (b). Therefore, we assert that both types I and II PSB are less likely in the literature despite the findings from the Galbraith plot mentioned above. Furthermore, in Panel (a), the null hypothesis that the coefficient of the inverse of standard error β_1 is zero is rejected in three of five models, meaning that genuine evidence does exist in the collected estimates. Moreover, Panel (c) shows that the coefficient of the inverse of standard error β_1 is statistically significantly different from zero in all five models. Therefore, we can say that the true value of the macroeconomic impact of FDI should be in the range of 0.1879 to 0.2104.

Judging from the above assessments, we conclude that the empirical results

[9] In contrast, if we assume that the true effect exists around zero, the ratio of the positive vs. the negative estimates becomes 140:32, which strongly rejects the null hypothesis that the ratio is 50:50 (z = 8.235, p = 0.000). In this case, type I PSB is strongly suspected.

reported in previous literature that examined the macroeconomic impact of FDI in transition economies as a whole have successfully provided empirical evidence to prove a nonzero FDI effect and, according to the Doucouliagos' criteria, its impact is positive but limited to a small size.

5 Conclusions

In this paper, we conducted a meta-analysis of the literature that empirically examined either the determinants of FDI in CEE and FSU countries or the causality between FDI and macroeconomic growth in the region over the past quarter century.

The study of FDI in transition economies has made substantial progress in the second half of 1990s and the first decades of the new century. The related literature published during these years carried out various empirical analyses, reflecting the differences in their authors' motivation, research aims, and theoretical grounding. Nevertheless, the meta-analysis in this paper has revealed that empirical results reported in the preceding studies indicate the close relationship between the progress of transition to a market economy and FDI and the positive effect of FDI on macroeconomic growth in the literature as a whole. In fact, the meta-synthesis of estimates extracted from the selected studies shows that the synthesized PCC for the study of the determinants of FDI and that of the macroeconomic impacts of FDI are 0.166 and 0.186, respectively, and the combined *t* values, weighted by the quality level of the studies, reach as high as 5.774 and 5.601, respectively (see **Tables 1** and **5**). These synthesis results are notable in comparison with studies of the rest of the world. For instance, according to the meta-analysis of macroeconomic impacts of FDI by Doucouliagos et al. (2010), which covered most countries and regions of the world, the synthesized PCC of 880 estimates collected from 108 studies is 0.12. If a comparison is allowed, we could say that CEE and FSU countries have benefited from FDI in terms of macroeconomic growth 1.55 times greater than the world average, indicating the high quality of foreign capital invested into the post-communist economies and the excellent absorption capacity of local firms and citizens in the former socialist bloc.

Nevertheless, the results of the MRA in this paper have unveiled that empirical evaluations in transition literature strongly depend on study conditions. Actually, we found that the composition of target countries, data type, control for time effects, choice of estimator, type of FDI, and transition variables are particularly important factors that explain the heterogeneity of the collected estimates in the study of FDI

determinants, while the composition of target countries and type of FDI variable systematically influence the empirical results reported in the study of macroeconomic impacts of FDI. We also found that the degree of freedom greatly affects the empirical results in the selected studies. The fact that the square root of the degree of freedom is estimated to be robust and negative in both study areas implies that econometrical evaluations of the FDI-inducing effect of the transition process and the growth-promoting effect of FDI in transition economies may become more conservative in tandem with further improvements in the precision of empirical analyses.

Furthermore, according to our assessment of the publication selection bias, studies of macroeconomic impacts of FDI contain genuine empirical evidence. In contrast, existing works have not yet proved the true effect in the study of determinants of FDI, due to the strong tendency of publication selection bias in the literature. It is likely that empirical evaluations of the effect of progress in transition on FDI might be revised downward in the future with the further accumulation of highly precise estimates. We hope that there will be more development and improvement in this research field so as to capture the true effect.

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Appendix 1
List of selected studies for meta-analysis

(a) Papers subject to meta-analysis in Section 3

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Appendix 2. List of selected studies on determinants of FDI in transition economies for meta-analysis

Author (Publication year)	Target country				Estimation period [c]	Model type	Data type	FDI variable type [d]	Type of transition variables [e]	Number of corrected estimates
	Number of countries	Breakdown by country group								
		CEE 10 EU countries [a]	Other CEE countries	FSU countries [b]						
Lansbury et al. (1996)	4	4			1991–1993	Bilateral	Panel	G	V	3
Papazoglou and Liargovas (1997)	6	2	1	3	1992-1995	Total	Panel	A	II, V	2
Selowsky and Martin (1997)	25	10	3	12	1990–1995	Total	Panel	F	II	2
Claessens et al. (2000)	21	10	3	8	1992–1996	Total	Panel	A	II	2
Döhrn (2000)	21	n/a	n/a	n/a	1994–1997	Total	Cross-section	A	VI	1
Garibaldi et al. (2001)	25	10	3	12	1990–1999	Total	Panel	B	II, VI	3
Grogan and Moers (2001)	25	10	3	12	1990–1998	Total	Cross-section	F	V	2
Bandelj (2002)	11	10	1		1995–1997	Bilateral	Cross-section	E	VI	1
Beyer (2002)	15	10		5	1995–1998	Total	Panel	F	I, V	3
Fabry and Zeghni (2002)	6	5		1	1991–1999	Total	Panel / Time series	A	I, III, IV, VI	12
Jensen (2002)	18	n/a	n/a	n/a	1993–1997	Total	Cross-section	F	I	1
Deichmann et al. (2003)	25	10	3	12	1989–1998	Total	Cross-section	E	VI	1
Edmiston et al. (2003)	25	10	3	12	1993–1998	Total	Panel	F	I, VI	2
Bevan et al. (2004)	12	10		2	1994–1998	Bilateral	Cross-section	A	I, II, IV, VI	6
Carstensen and Toubal (2004)	7	7			1993–1999	Bilateral	Panel	A	V	4
Bellak and Leibrecht (2006)	5	5			1996–2002	Bilateral	Panel	F	V	1
Botrić and Škuflić (2006)	7	2	5		1996–2002	Total	Panel	A, C	V	2
Fabry and Zeghni (2006)	11	8	3		1992–2003	Total	Panel	D	III, IV	19
Bellak and Leibrecht (2007a)	8	7	1		1995–2003	Bilateral	Panel	A	V	2
Bellak and Leibrecht (2007b)	8	7	1		1995–2003	Bilateral	Panel	A	V	1
Demekas et al. (2007)	16	10	6		1995–2003	Total/Bilateral	Panel / Cross-section	A, C	II, VI	8
Dhakal et al. (2007)	8	8			1995-2004	Total	Panel	B	VI	1
Bandelj (2008a)	11	10	1		1990–2000	Total	Panel	D	V	3
Bandelj (2008b)	11	10	1		1995–1997	Bilateral	Cross-section	E	VI	1
Bellak et al. (2008)	8	7	1		1995–2003	Bilateral	Panel	A	V	4
Torrisi et al. (2008)	4	4			1989–2006	Total	Panel	A	V	1
Bellak and Leibrecht (2009)	8	7	1		1995–2003	Bilateral	Panel	A	V	2
Bellak et al. (2009)	8	7	1		1995–2004	Bilateral	Panel	A	II, V	9
Iwasaki and Suganuma (2009)	21	10	5	6	1990–2005	Total/Bilateral	Panel	B, D	V	4
Leibrecht and Scharler (2009)	7	6	1		1995–2004	Bilateral	Panel	A	V	7
Merlevede and Schoors (2009)	10	10			1992–2000	Bilateral	Panel	C	III	1
Sova et al. (2009)	4	4			1990-2005	Bilateral	Panel	B	I	1
Bandelj (2010)	10	10			1994–2000	Total	Panel	D	I, VI	2
Lefilleur and Maurel (2010)	11	10	1		1993–2005	Total	Panel	B	V	2
Overesch and Wamser (2010)	10	10			1996–2005	Bilateral	Panel	C	V, VI	6
Hengel (2011)	8	2	6		1995-2008	Total	Panel	C	I, III, IV, V, VI	6
Seric (2011)	10	10			1995-2005	Total	Panel	C	III, V, VI	17
Derado (2013)	12	10	2		1996–2004	Bilateral	Panel	C	V	3
Sakali (2013)	1	1			1998–2008	Bilateral	Panel	A	I, VI	1
Estrin and Uvalic (2014)	17	10	6	1	1990-2011	Bilateral	Panel	A	V	4
Dauti (2015a)	15	10	5		1994-2010	Bilateral	Panel	C	I, VI	8
Dauti (2015b)	15	10	5		1994-2010	Bilateral	Panel	C	I, VI	8
Lee (2015)	20	10	3	7	1995–2006	Total	Panel	B	IV, V, VI	6
Shukurov (2016)	11			11	1995-2010	Total	Panel	F	IV, VI	4

Notes:

[a] CEE 10 EU countries denote the 10 Central and Eastern European countries that joined the European Union either in 2004 or 2007.

[b] Excluding the Baltic countries

[c] Asian transition economies including China and Mongolia

[d] Estimation period may differ depending on target country.

[e] A: Annual net FDI inflow; B: Annual gross FDI inflow; C: Cumulative gross FDI value or FDI (including fixed capital) stock; D: Annual net or gross FDI inflow per capita; E: Cumulative net FDI value per capita; F: Annual net FDI inflow to GDP (including manufacturing value added) or annual gross FDI inflow to manufacturing output; G: Others (number of FDI projects, etc.)

[f] I: General transition indicators; II: Liberalization indicators; III: Enterprise reform indicators; IV: Competition policy indicators; V: Privatization indicators; VI: Other indicators (trade and forex systems, efficiency of law institutions, infrastructure reform, financial sector reform, and so on)

Appendix 3. List of selected studies on macroeconomic impacts of FDI in transition economies for meta-analysis

Author (Publication year)	Target country					Estimation period [d]	Data type	Macroeconomic variable		FDI variable type [f]	Number of corrected estimates
	Number of countries	Breakdown by country group						Benchmark index	Variable type [e]		
		CEE 10 EU countries [a]	Other CEE countries	FSU countries [b]	Others [c]						
Barrell and Holland (2000)	3	3				1993-1996	Panel	Gross value added	III	A, E	9
Campos and Kinoshita (2002)	25	10	3	12		1990-1998	Panel	GDP	II	F	2
Cernat and Vranceanu (2002)	10	10				1992-1999	Panel	GDP	I	C	2
Mencinger (2003)	8	8				1994-2001	Panel	GDP	II	C	5
Lyroudi et al. (2004)	17	4	2	10	1	1995-1998	Panel	GDP	II	C	2
Neuhaus (2005)	13	10	3			1991-2002	Panel	GDP	II	C	1
Redek and Sušjan (2005)	24	10	3	11		1995-2002	Panel	GDP	III	C	1
Eller et al. (2006)	10	9	1			1996-2003	Panel	GDP	III	F, H	13
Kukeli et al. (2006)	10	7	3			1990-2001	Panel	GDP	II	A, C, F	9
Tvaronavičienė and Grybaitė (2007)	1	1				2000-2006	Time series	GDP	I	A	1
Apergis et al. (2008)	27	10	4	12	1	1991-2004	Panel	GDP	I	B	5
Kutan and Yigit (2009)	8	8				1995-2006	Panel	Gross industrial production	III	C	6
Nath (2009)	13	10	3			1990-2005	Panel	GDP	IV	C	6
Pelinescu and Rădulescu (2009)	1	1				2000-2009	Time series	GDP	II	G	1
Sridharan et al. (2009)	1			1		1994-2007	Time series	Gross industrial production	I	B	2
Bijsterbosch and Kolasa (2010)	8	8				1995-2005	Panel	Sectoral value added	III	D	15
Sapienza (2010)	12	10	2			1999-2006	Panel	GDP	I	H	3
Varamini and Kalash (2010)	10	10				1993-2006	Time series	GDP	I	B	10
Fidrmuc and Martin (2011)	11	10	1			1995-2009	Time series	Gross industrial production	I	A	11
Kornecki and Raghavan (2011)	5	5				1993-2003	Panel	GDP	II	G	1
Weber (2011)	8	7		1		1993-2009	Time series	GDP	I	B	7
Hudea and Stancu (2012)	7	6		1		1993-2009	Panel	GDP	III	B	10
Cieślik and Tarsalewska (2013)	24	10	4	10		1993-2006	Panel	GDP	II	A, C	12
Mehic et al. (2013)	7	2	5			1998-2007	Panel	GDP	III	A	1
Angelopoulou and Liargovas (2014)	18	6	12			1989-2008	Panel	GDP	II	B	2
Gjançi and Çërava (2014)	1		1			1995-2012	Time series	GDP	I	B	1
Acharya and Nuriev (2016)	30	10	4	11	5	1995-2010	Panel	GDP	II	C	7
Mano-Bakalinov (2016)	1		1			1993-2014	Time series	GDP	I	B	1
Silajdzic and Mehic (2016)	10	10				2000-2011	Panel	GDP	III	A	4
Vukšić (2016)	1		1			1998-2007	Panel	Secoral value added	IV	F	14
Elmawazini et al. (2018)	14		4	10		2000-2012	Panel	GDP	III	B	8

Notes:

[a] CEE 10 EU countries denote the 10 Central and Eastern European countries that joined the European Union either in 2004 or 2007.

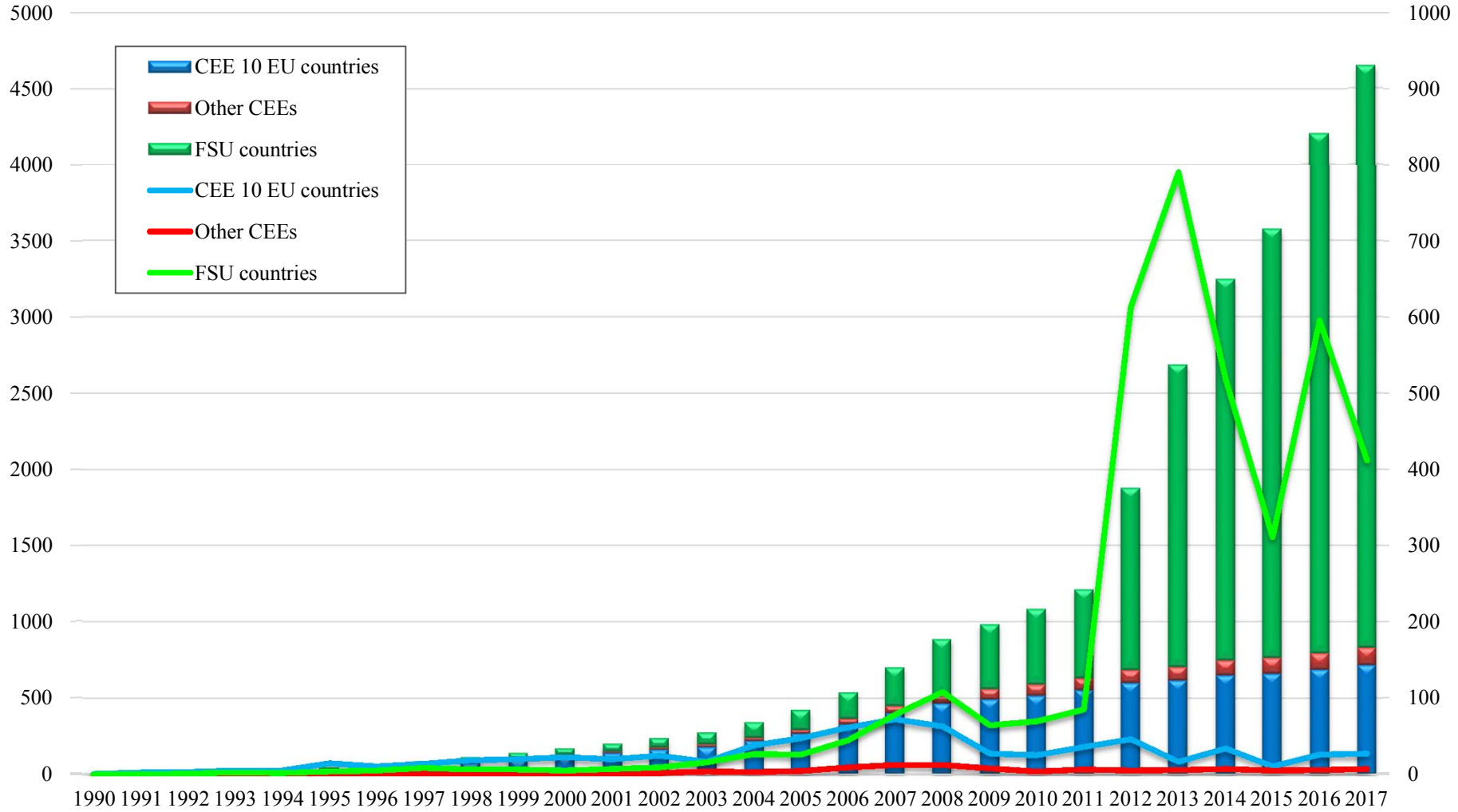
[b] Excluding the Baltic countries

[c] Estimation period may differ depending on target country.

[d] I: Level of output volume; II: Change in output volume; III: Level of productivity; IV: Change in productivity level

[e] A: Cumulative investment value; B: Annual capital inflow; C: FDI to GDP; D: FDI to gross value added; E: FDI to gross fixed capital formation; F: Cumulative FDI per capita (worker); G: Growth rate; H: Others

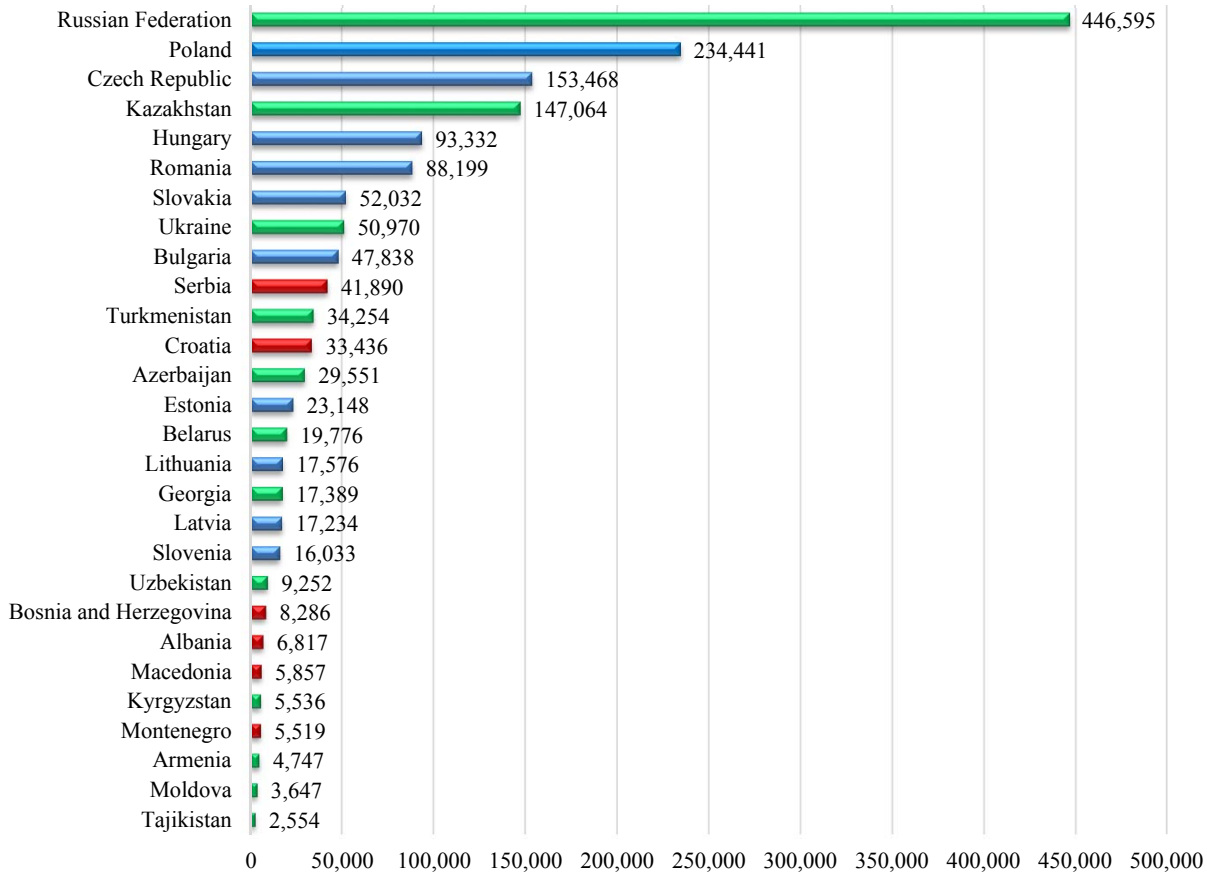
Figure 1. The dynamics of FDI into CEE and FSU countries in 1990-2017 (Billion USD)



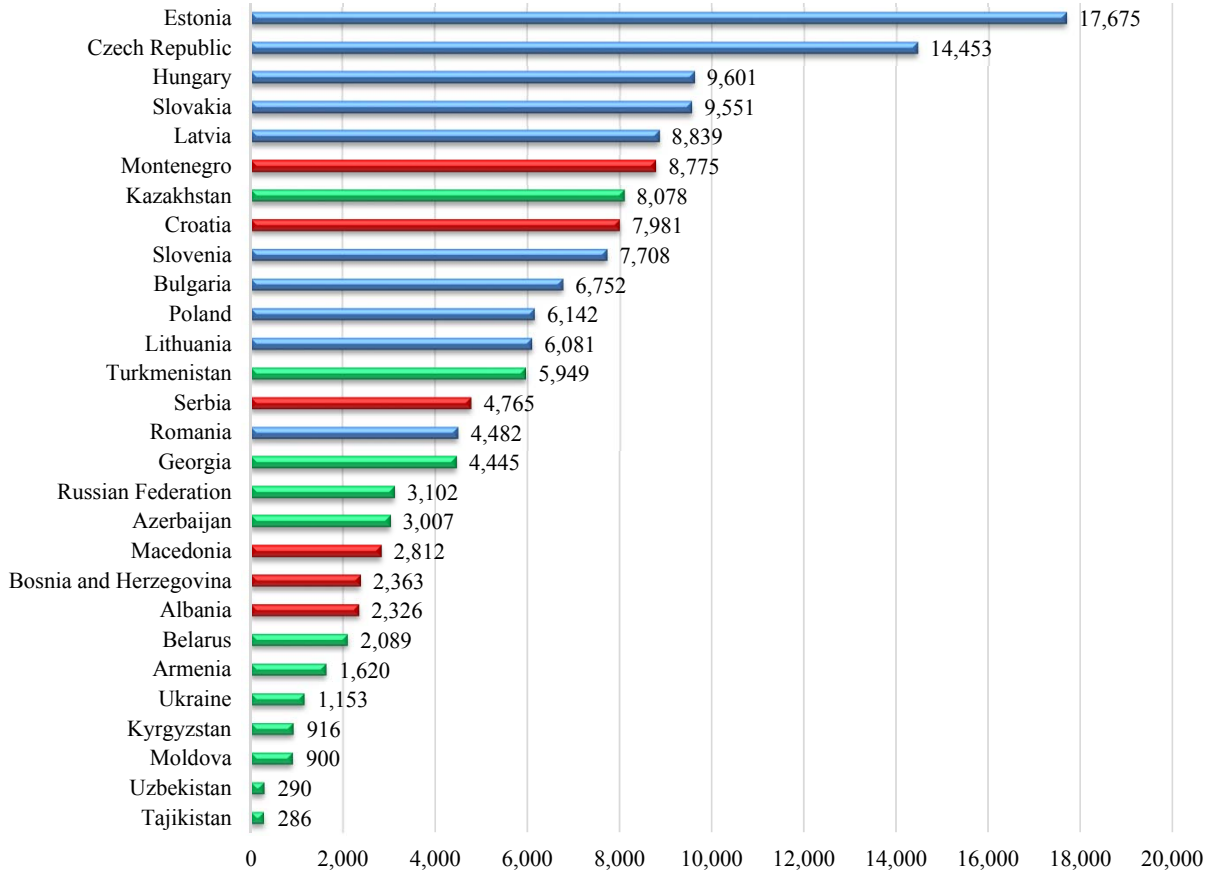
Note: The line graph (right axis) and the bar graph (left axis) illustrate the annual inflow and stock value of foreign direct investment, respectively. CEE 10 EU countries denote the Central and Eastern European countries that joined the European Union either in 2004 or 2007. FSU excludes the Baltic countries.
Source: UNCTAD website (http://unctadstat.unctad.org/)

Figure 2. FDI stock and per capita value in CEE and FSU countries in 2017

(a) FDI stock (million USD)



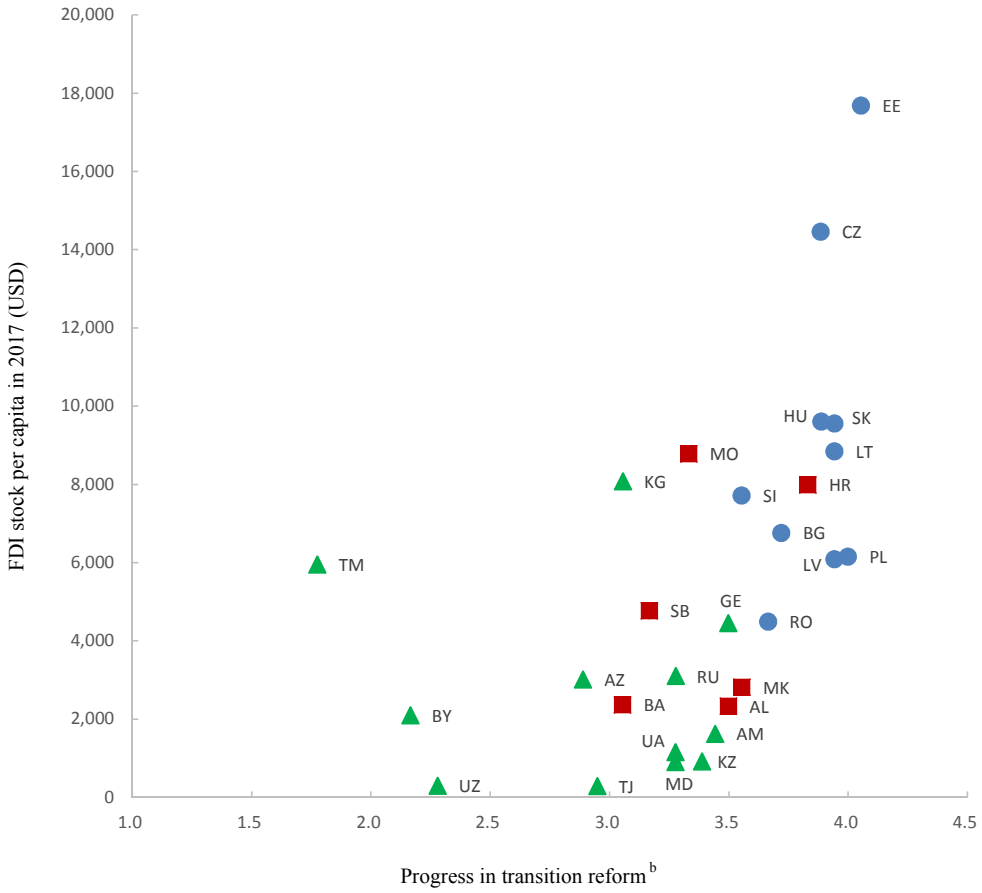
(b) FDI stock per capita (USD)



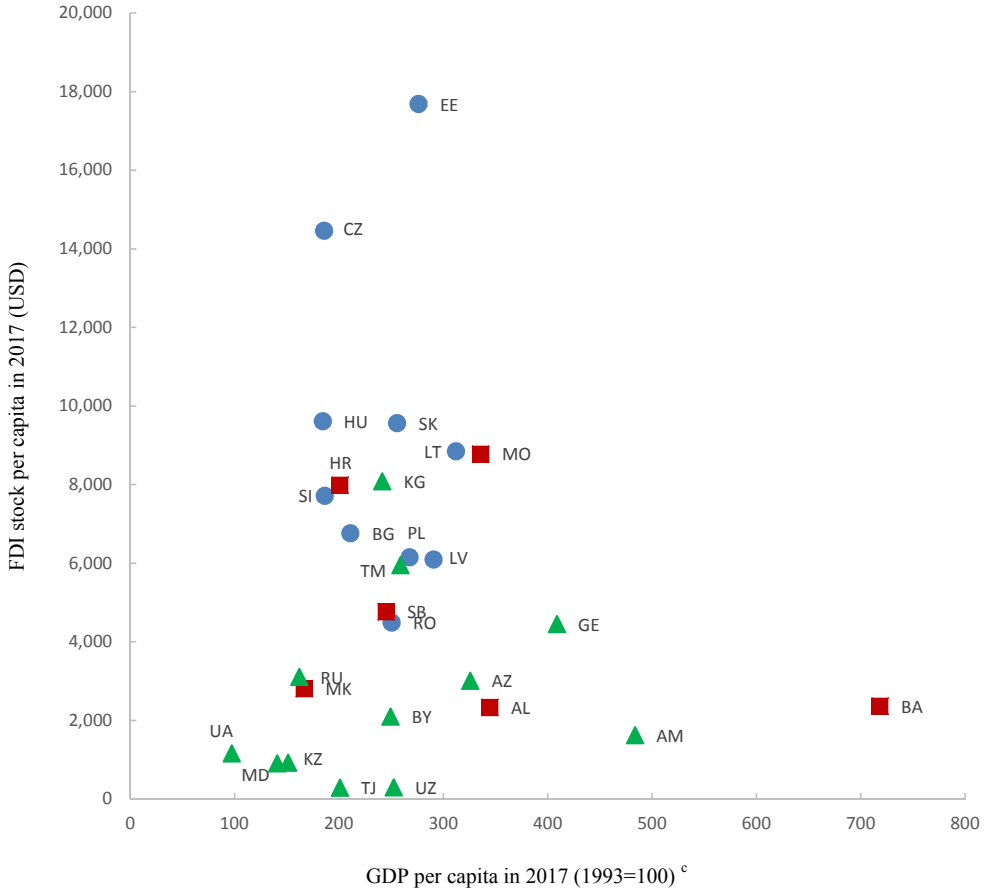
Note: ■, ■, and ■ represent CEE 10 EU member countries that joined the European Union either in 2004 or 2007, other CEE countries, and FSU countries, respectively.
Source: UNCTAD website (http://unctadstat.unctad.org/)

Figure 3. Relationship between FDI inflow, transition reform, and economic growth in the CEE and FSU countries [a]

(a) FDI inflow and transition reform



(b) FDI inflow and economic growth



Notes:

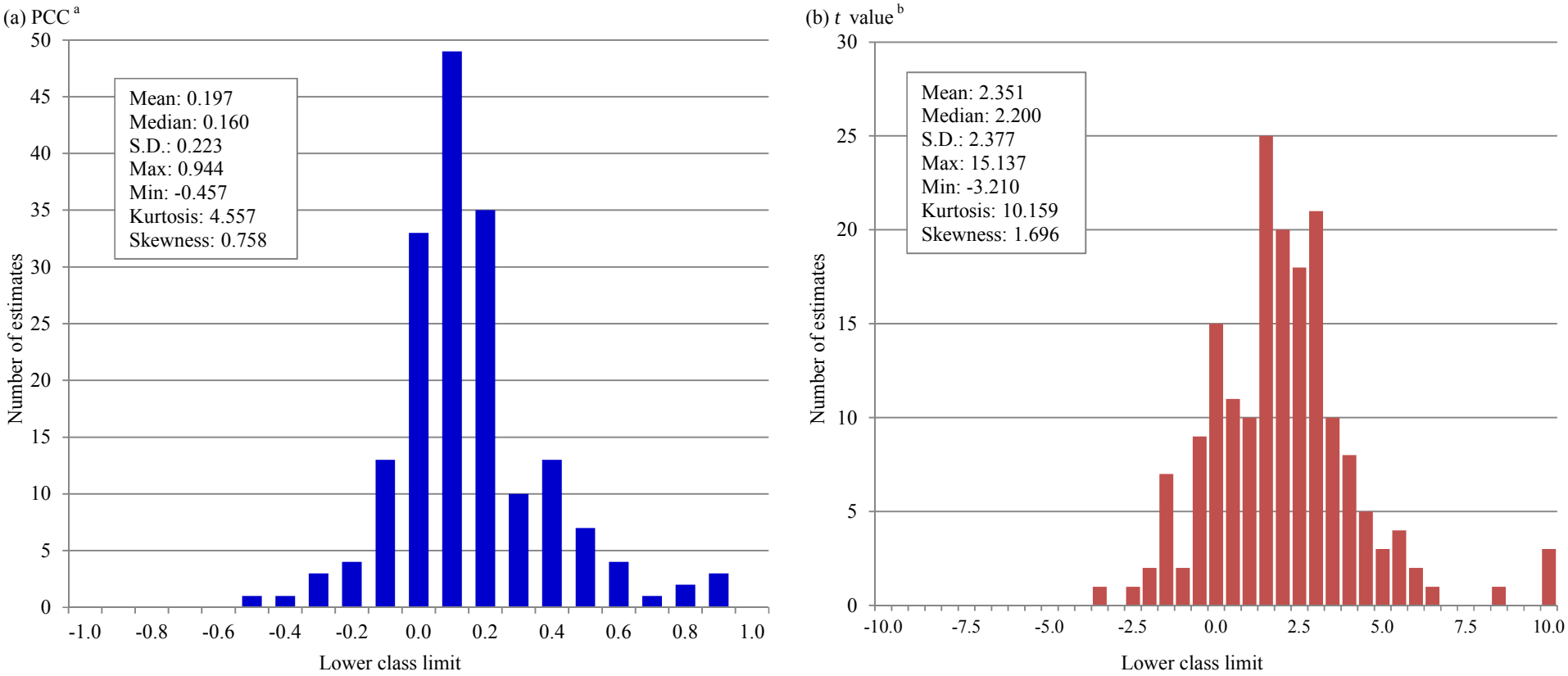
[a] Country abbreviations: AL — Albania; AM — Armenia; AZ — Azerbaijan; BA — Bosnia and Herzegovina; BG — Bulgaria; BY — Belarus; CZ — Czech Republic; EE — Estonia; GE — Georgia; HR — Croatia; HU — Hungary; KG — Kyrgyzstan; KZ — Kazakhstan; LT — Lithuania; LV — Latvia; MD — Moldova; MK — FYR Macedonia; MO - Montenegro; PL — Poland; RO — Romania; RU — Russia; SB — Serbia; SI — Slovenia; SK — Slovakia; TJ — Tajikistan; TM — Turkmenistan; UA — Ukraine; UZ — Uzbekistan. ●, ■, and ▲ represent CEE 10 EU member countries that joined the European Union either in 2004 or 2007, other CEE countries, and FSU states, respectively.

[b] The average of EBRD transition scores in 2014 on large scale privatizaation, small scale privatization, governance and enterprise restructuring, price liberalization, trade and forex system, and competition policy. The figure for the Czech republic is in 2007. The index takes the range between 1.00 (representing little or no change from a rigid centrally planned economy) and 4.33 (representing the standards of an industrialized market economy).

[c] Computed using data in US 2010 constant price

Source: EBRD (http://www.ebrd.com/pages/homepage.shtml) and UNCTAD (http://unctadstat.unctad.org/) websites

Figure 4. Distribution of partial correlation coefficients and *t* values of the collected estimates of determinants of FDI (*K*=179)

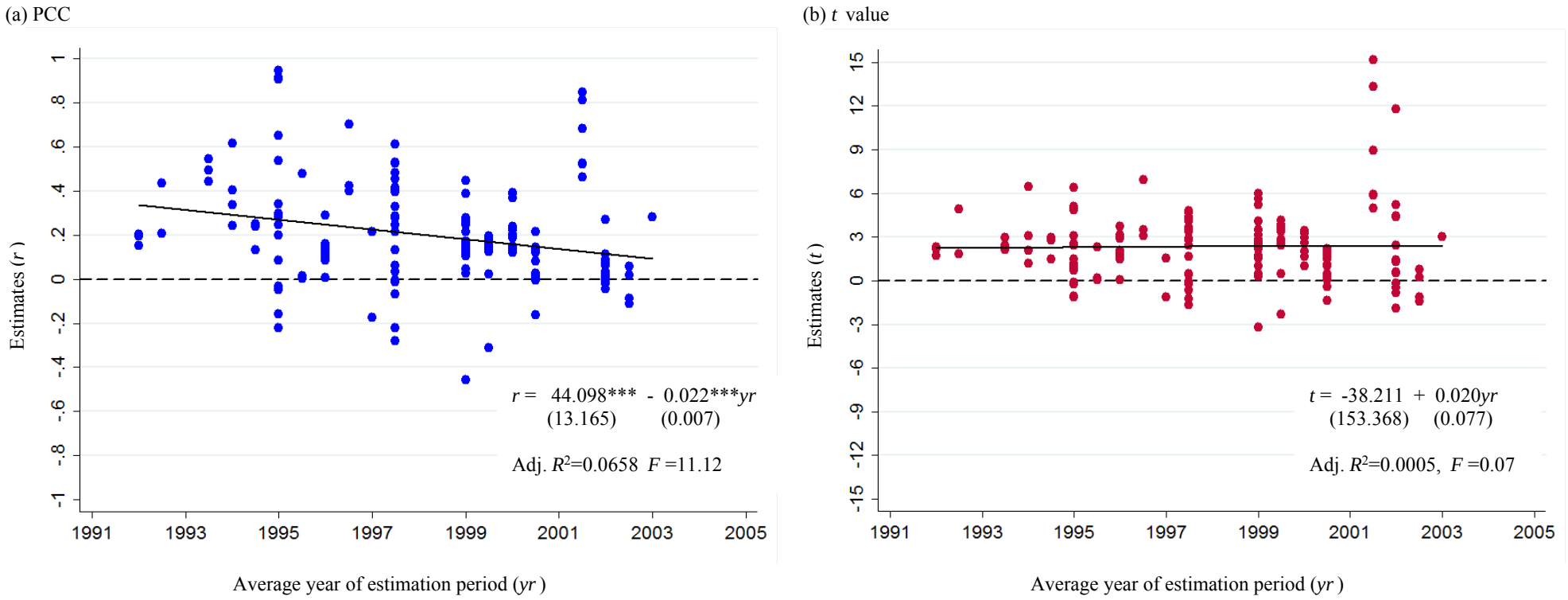


Notes:

[a] Shapiro-Wilk normality test: V=6.979, p=0.000

[b] Shapiro-Wilk normality test: V=16.033, p=0.000

Figure 5. Chronological order of partial correlation coefficients and t values of the collected estimates of determinants of FDI (K=179)



Note: Figures in parentheses beneath the regression coefficients of the approximate straight line are robust standard errors. *** denotes statistical significance at the 1% level.

Table 1. Synthesis of collected estimates of determinants of FDI

	Number of estimates (K)	(a) Synthesis of PCCs			(b) Combination of t values			
		Fixed-effect model [a]	Random-effects model [a]	Test of homogeneity [b]	Unweighted combination	Weighted combination	Median of t values	Failsafe N *(fsN)*
All studies	179	0.055 ***	0.166 ***	1588.308 ***	31.452 ***	5.774 ***	2.351	65257
(a) Comparison in terms of data type								
Studies that employ panel data	159	0.053 ***	0.159 ***	1463.511 ***	29.533 ***	5.518 ***	2.342	51090
Studies that employ cross-sectional data	17	0.148 ***	0.159 ***	25.080 *	7.777 ***	1.228	1.886	363
Studies that employ time series data	3	0.926 ***	0.926 ***	0.028	9.431 ***	1.886 **	5.445	96
(b) Comparison in terms of model type								
Studies that adopt total FDI model	102	0.225 ***	0.263 ***	729.976 ***	24.380 ***	5.040 ***	2.414	22303
Studies that adopt bilateral FDI model	77	0.039 ***	0.090 ***	497.709 ***	19.894 ***	3.228 ***	2.267	11185
(c) Comparison in terms of the type of FDI variable								
Studies that use annual net FDI inflow	51	0.069 ***	0.164 ***	302.244 ***	18.321 ***	2.861 ***	2.565	6275
Studies that use annual gross FDI inflow	24	0.098 ***	0.109 ***	75.306 ***	8.409 ***	1.363 *	1.716	603
Studies that use cumulative gross FDI value or FDI (including fixed capital) stock	55	0.037 ***	0.155 ***	854.353 ***	19.617 ***	4.904 ***	2.645	7767
Studies that use annual net or gross FDI inflow per capita	29	0.232 ***	0.260 ***	119.629 ***	12.431 ***	2.416 ***	2.308	1627
Studies that use cumulative net FDI value per capita	3	0.137 ***	0.174 ***	5.209 *	3.784 ***	0.617	2.185	13
Studies that use annual net FDI inflow to GDP (including manufacturing value added) or annual gross FDI inflow to manufacturing output	14	0.135 ***	0.186 ***	74.537 ***	6.299 ***	1.057	1.684	191
Studies that use other types of FDI variables (number of FDI projects, etc.)	3	0.185 ***	0.185 **	0.182	3.580 ***	0.895	2.067	11
(d) Comparison in terms of the type of transition variable								
Studies that use general transition indicators	20	0.122 ***	0.224 ***	445.870 ***	18.776 ***	4.800 ***	4.198	2586
Studies that use liberalization indicators	13	0.208 ***	0.257 ***	50.030 ***	9.878 ***	1.296 *	2.740	456
Studies that use enterprise reform indicators	22	0.260 ***	0.312 ***	57.664 ***	12.373 ***	2.969 ***	2.638	1223
Studies that use competition policy indicators	18	0.163 ***	0.153 ***	73.376 ***	5.719 ***	1.290 *	1.348	200
Studies that use privatization indicators	65	0.050 ***	0.138 ***	430.853 ***	20.317 ***	3.177 ***	2.520	9850
Studies that use other indicators	41	0.013 ***	0.085 ***	223.408 ***	8.607 ***	1.885 **	1.344	1081

Notes:

[a] Null hypothesis: The synthesized effect size is zero.

[b] Null hypothesis: Effect sizes are homogeneous.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 2. Name, definition, and descriptive statistics of meta-independent variables used in meta-regression analysis of heterogeneity among studies of determinants of FDI

Variable name	Definition	Descriptive statistics		
		Mean	Median	S.D.
Proportion of CEE 10 EU countries	Proportion of CEE 10 EU countries in the host target countries [a]	0.736	0.857	0.298
Proportion of other CEE countries	Proportion of other CEE countries in the host target countries	0.153	0.120	0.213
Proportion of EU countries	Proportion of EU advanced countries in the home target countries [b]	0.425	0.077	0.394
Proportion of non-EU countries	Proportion of non-EU advanced countries in the home target countries [b]	0.098	0.081	0.058
First year of estimation	First year of estimation period	1993.508	1994	1.964
Length of estimation	Years of estimation period	10.721	10.000	3.935
Cross-section	1 = if cross-sectional data is employed for analysis, 0 = otherwise	0.095	0	0.294
Time series	1 = if time series data is employed for analysis, 0 = otherwise	0.017	0	0.129
Individual	1 = if individual effects of the host target countries are controlled, 0 = otherwise	0.458	0.0	0.500
Time	1 = if time effects during the estimation period are controlled, 0 = otherwise	0.380	0	0.487
FE	1 = if fixed-effects panel estimator is used for estimation, 0 = otherwise	0.184	0	0.389
RE	1 = if random-effects panel estimator is used for estimation, 0 = otherwise	0.413	0	0.494
SLS	1 = if two-step least squares estimator is used for estimation, 0 = otherwise	0.034	0	0.180
GMM	1 = if generalized method of moments estimator is used for estimation, 0 = otherwise	0.128	0	0.336
Bilateral	1 = if bilateral FDI model is used for analysis, 0 = otherwise	0.430	0	0.496
Log	1 = if logarithmic value of the dependent variable is used for estimation, 0 = otherwise	0.832	1	0.375
Annual gross inflow	1 = if FDI variable is measured in annual gross inflow, 0 = otherwise	0.134	0	0.342
Cumulative gross value or stock	1 = if FDI variable is measured in cumulative gross value or stock (including fixed capital), 0 = otherwise	0.307	0	0.463
Annual net or gross inflow per capita	1 = if FDI variable is measured in annual net or gross inflow per capita, 0 = otherwise	0.162	0	0.369
Cumulative net value per capita	1 = if FDI variable is measured in cumulative net value per capita, 0 = otherwise	0.017	0	0.129
Annual net inflow to GDP etc.	1 = if FDI variable is measured in annual net inflow to GDP (including manufacturing value added) or annual gross inflow to manufacturing output, 0 = otherwise	0.078	0	0.269
Other FDI variables	1 = if another FDI variable is used, 0 = otherwise	0.017	0	0.129
Liberalization	1 = if the liberalization indicator is used as the economic transition variable, 0 = otherwise	0.073	0	0.260
Enterprise reform	1 = if the enterprise reform indicator is used as the economic transition variable, 0 = otherwise	0.123	0	0.329
Competition policy	1 = if the competition policy indicator is used as the economic transition variable, 0 = otherwise	0.101	0	0.302
Privatization	1 = if the privatization indicator is used as the economic transition variable, 0 = otherwise	0.363	0	0.482
Other transition indicators	1 = if another indicator is used as the economic transition variable, 0 = otherwise	0.229	0	0.421
$\sqrt{}$ Degree of freedom	Root of degree of freedom of the estimated model	18.881	11.314	19.383
Quality level	Ten-point scale of the quality level of the study [c]	4.654	5	2.839

Notes:

[a] CEE EU countries denote the 10 Central and Eastern European countries that joined the European Union either in 2004 or 2007.

[b] For the total FDI model, all home countries are conveniently divided into four categories according to the country group classificaton of the UNCTAD Handbook of Statistics 2012: among 221 countries listed, 17 are classified as EU advanced countries, 18 as non-EU advanced countries, and the remaining 186 as emerging and developing countries, including the former socialist countries.

[b] See Appendix A of Iwasaki and Tokunaga (2014) for more details.

Table 3. Meta-regression analysis of heterogeneity among studies of determinants of FDI

(a) Dependent variable — PCC

Estimator (Analytical weight in parentheses)	Cluster-robust OLS	Cluster-robust WLS [Quality level]	Cluster-robust WLS [N]	Cluster-robust WLS [$1/SE$]	Multilevel mixed effects RML	Random-effects panel GLS	Fixed-effects panel LSDV
Meta-independent variable (Default) / Model	[1]	[2]	[3]	[4] [a]	[5]	[6] [b]	[7] [c]
Composition of host target countries (FSU)							
Proportion of CEE 10 EU countries	0.009	-0.056	0.020	-0.165 *	0.011	0.011	0.003
Proportion of other CEE countries	0.244 **	0.149	0.286 *	0.133	0.233 ***	0.234 ***	0.236 ***
Composition of home target countries (Non-advanced countries)							
Proportion of EU	-0.048	-0.095	-0.032	-0.196	0.030	0.034	dropped
Proportion of non-EU	-0.748 *	-0.767 ***	-0.436 *	-0.343	-0.632 *	-0.629 *	dropped
Estimation period							
First year of estimation	-0.011	-0.010	-0.012	0.004	-0.017 *	-0.017	dropped
Length of estimation	0.000	0.001	-0.020 **	-0.006	0.001	0.001	dropped
Data type (Panel data)							
Cross-section	-0.147 **	-0.120 **	-0.194 ***	-0.034	-0.171 **	-0.173 **	-0.339 **
Time series	0.689 ***	0.681 ***	0.632 ***	0.590 ***	0.719 ***	0.721 ***	0.758 ***
Control for individual and time effects (No control)							
Individual	-0.058	-0.040	-0.056	-0.061 *	-0.053	-0.052	-0.036
Time	0.133 **	0.126 **	0.055	0.157 ***	0.109 **	0.106 *	-0.082
Estimator (OLS)							
FE	-0.104 *	-0.135 **	-0.053	-0.055	-0.118 **	-0.119 **	-0.146 **
RE	-0.128 **	-0.108 **	-0.090	-0.077	-0.130 ***	-0.130 ***	-0.141 **
SLS	-0.233 ***	-0.326 ***	-0.085	-0.197 **	-0.209 ***	-0.208 ***	-0.197 ***
GMM	-0.116 *	-0.072	-0.106 **	-0.014	-0.123 **	-0.124 *	-0.212 **
Model type (Total FDI model)							
Bilateral	-0.088	0.003	-0.086	0.006	-0.126	-0.127	-0.243 ***
Form of dependent variable (Exact numeric value)							
Log	-0.041	-0.028	0.009	-0.090	-0.019	-0.018	dropped
Type of FDI variable (Annual net inflow)							
Annual gross inflow	-0.151 **	-0.095 **	-0.103 **	-0.080 ***	-0.192 ***	-0.195 ***	-0.011 ***
Cumulative gross value or stock	-0.022	0.026	-0.071	0.031	-0.051	-0.053	-0.243 ***
Annual net or gross inflow per capita	0.009	0.080	-0.015	0.085 *	-0.076	-0.081	dropped
Cumulative net value per capita	0.198 *	0.161	0.004	0.010	0.177 *	0.177 *	dropped
Annual net inflow to GDP etc.	-0.141	-0.072	-0.121	-0.127	-0.148	-0.148	dropped
Other FDI variables	-0.042	-0.007	-0.160 **	-0.004	-0.084	-0.087	dropped
Type of transition variable (General transition indicators)							
Liberalization	-0.018	0.050	-0.110	-0.043	-0.050	-0.052	-0.099
Enterprise reform	0.005	0.085	-0.022	-0.069	-0.066	-0.070	-0.136 *
Competition policy	-0.153	-0.125	-0.120 *	-0.198 ***	-0.225 ***	-0.229 **	-0.295 ***
Privatization	-0.001	0.076	-0.073 **	-0.109 *	-0.045	-0.049	-0.138 **
Other transition indicators	-0.062	0.033	-0.084 ***	-0.163 **	-0.082	-0.083	-0.107 **
Degree of freedom and research quality							
√Degree of freedom	-0.003 **	-0.004 ***	-0.001	-0.003 ***	-0.004 **	-0.004 **	-0.001
Quality level	0.002	-	-0.001	0.005	-0.002	-0.002	dropped
Intercept	21.990	20.772	25.009	-6.637	34.191 *	34.901	0.665 ***
K	177	177	177	177	177	177	177
R^2	0.558	0.593	0.638	0.828	-	0.523	0.220

(continued)

(b) Dependent variable — t value

Estimator (Analytical weight in parentheses)	Cluster-robust OLS	Cluster-robust WLS [Quality level]	Cluster-robust WLS [N]	Cluster-robust WLS [$1/SE$]	Multilevel mixed effects RML	Random-effects panel GLS	Fixed-effects panel LSDV
Meta-independent variable (Default) / Model	[8]	[9]	[10]	[11][a]	[12]	[13][d]	[14][e]
Composition of host target countries (FSU)							
Proportion of CEE 10 EU countries	1.033	0.480	0.695	-0.216	0.786	0.765	0.144
Proportion of other CEE countries	3.655 **	2.408	4.333	3.564 *	2.659 ***	2.577 ***	1.430 ***
Composition of home target countries (Non-advanced countries)							
Proportion of EU	-0.473	0.436	1.475	-1.580	0.503	0.591	dropped
Proportion of non-EU	-14.054 **	-11.667 **	-8.788 *	-7.353	-11.964 **	-12.155 **	dropped
Estimation period							
First year of estimation	0.014	-0.014	-0.130	0.066	-0.090	-0.095	dropped
Length of estimation	0.142	0.174 **	-0.239	0.053	0.127	0.125	dropped
Data type (Panel data)							
Cross-section	-2.744 ***	-2.709 ***	-4.806 ***	-2.201 ***	-2.899 ***	-2.945 ***	-5.967 ***
Time series	3.851 ***	3.965 ***	1.030	3.067 ***	4.277 ***	4.329 ***	3.639 ***
Control for individual and time effects (No control)							
Individual	-1.083 *	-0.640	-1.134 *	-1.119 *	-0.868	-0.826	-1.454 ***
Time	1.095	0.977	-0.309	1.584 **	0.788	0.682	-1.360 **
Estimator (OLS)							
FE	-0.775	-1.945 **	-1.097	-0.198	-1.161 *	-1.195 *	-0.800 **
RE	-1.064	-1.264 **	-1.033	-0.419	-0.961	-0.956	-1.083 ***
SLS	-2.120 **	-3.630 ***	-0.411	-1.973 *	-1.807 ***	-1.783 ***	-1.470 ***
GMM	-1.879 **	-1.733 **	-2.782 ***	-0.668	-2.045 ***	-2.094 ***	-3.627 ***
Model type (Total FDI model)							
Bilateral	0.171	0.291	-1.352	0.846	-0.318	-0.361	-6.523 ***
Form of dependent variable (Exact numeric value)							
Log	-0.665	-0.607	0.311	-0.681	-0.209	-0.149	dropped
Type of FDI variable (Annual net inflow)							
Annual gross inflow	-1.675 **	-1.118 **	-1.952 **	-1.404 ***	-1.928 ***	-1.967 **	-0.190 ***
Cumulative gross value or stock	0.103	0.160	-1.684	0.347	-0.012	-0.044	-6.506 ***
Annual net or gross inflow per capita	-0.710	0.099	-1.823 *	-0.392	-1.784 *	-1.884 *	dropped
Cumulative net value per capita	3.609 ***	3.454 ***	1.433	2.471 *	3.101 ***	3.088 **	dropped
Annual net inflow to GDP etc.	-1.665	-0.926	-2.494	-1.056	-1.659	-1.645	dropped
Other FDI variables	0.028	-0.637	-3.524 **	0.037	-0.414	-0.391	dropped
Type of transition variable (General transition indicators)							
Liberalization	-1.778	-0.191	-4.862 ***	-2.093	-2.763 **	-2.892 **	-4.063 **
Enterprise reform	-1.847	-0.485	-2.997 **	-2.701 **	-3.271 **	-3.411 **	-4.481 ***
Competition policy	-2.815 **	-1.930 *	-3.945 ***	-3.328 ***	-4.302 ***	-4.448 ***	-5.552 ***
Privatization	-1.286	0.225	-3.736 ***	-2.427 ***	-2.410 **	-2.548 **	-3.994 ***
Other transition indicators	-2.747 **	-0.856	-3.879 ***	-3.565 ***	-3.364 ***	-3.442 ***	-4.165 ***
Degree of freedom and research quality							
$\sqrt{}$ Degree of freedom	-0.051 **	-0.051 ***	0.000	-0.041 **	-0.043 **	-0.041 **	0.083
Quality level	0.176	-	0.077	0.147	0.116	0.113	dropped
Intercept	-22.209	31.225	270.740	-125.489	186.280	196.427	11.924 ***
K	177	177	177	177	177	177	177
R^2	0.450	0.426	0.644	0.630	-	0.370	0.011

Notes:

[a] Excluding two estimates collected from Döhrn (2000) and Jensen (2002) that do not report the composition of host target countries.

[b] Breusch-Pagan test: $\chi^2=0.68$, $p=0.205$

[c] Hausman test fails to meet the asymptotic assumptions.

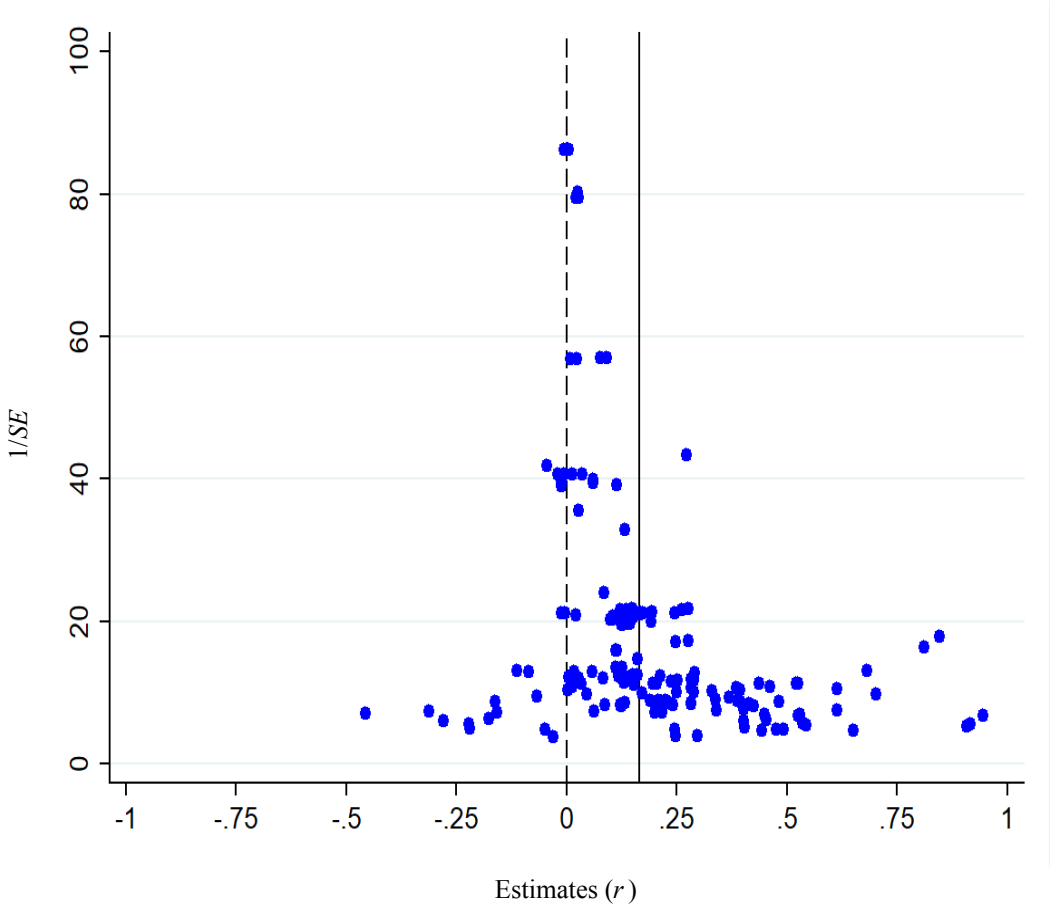
[d] Breusch-Pagan test: $\chi^2=3.73$, $p=0.027$

[e] Hausman test fails to meet the asymptotic assumptions.

Robust standard errors are used for hypothesis testing. ***, **, and * denote statistical significance of the regression coefficient at the 1%, 5%, and 10% levels, respectively.

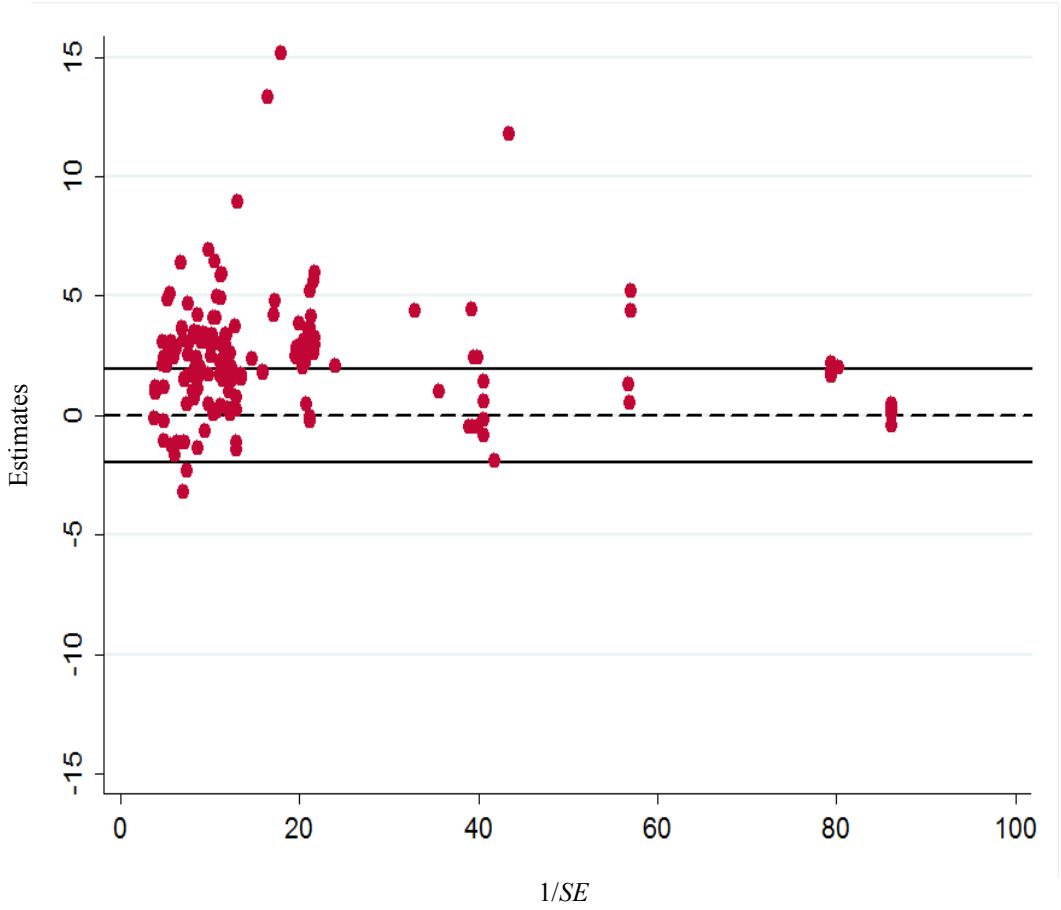
Source: See Table 2 for definition and descriptive statistics of meta-independent variables.

Figure 6. Funnel plot of partial correlation coefficients of collected estimates of determinants of FDI (K =179)



Note: Solid line indicates the synthesized value of 0.166 obtained from the random-effects model reported in Table 1.

Figure 7. Galbraith plot of *t* values collected estimates of determinants of FDI (*K* =179)



Note: Solid lines indicate the thresholds of two-sided critical values at the 5% significance level ±1.96.

Table 4. Meta-regression analysis of publication selection in the studies on determinants of FDI

(a) FAT (Type I PSB)-PET test (Equation: $t=\beta_0+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Model	[1]	[2]	[3]	[4] [a]	[5] [b]
Intercept (FAT: H_0: $\beta_0=0$)	2.5883 ***	2.5883 ***	2.4629 ***	2.5002 ***	-0.4579
$1/SE$ (PET: H_0: $\beta_1=0$)	-0.0123 *	-0.0123	-0.0051	-0.0069	0.1450
K	179	179	179	179	179
R^2	0.010	0.010	-	0.010	0.010

(b) Test of type II PSB (Equation: $|t|=\beta_0+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Model	[6]	[7]	[8]	[9] [c]	[10] [d]
Intercept (H_0: $\beta_0=0$)	2.8752 ***	2.8752 ***	2.8625 ***	2.8962 ***	1.1587
$1/SE$	-0.0145 **	-0.0145	-0.0118	-0.0136	0.0742
K	179	179	179	179	179
R^2	0.017	0.017	-	0.017	0.017

(c) PEESE approach (Equation: $t=\beta_0 SE+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Random-effects panel ML	Population-averaged panel GEE
Model	[11]	[12]	[13]	[14]	[15]
SE	14.8219 ***	14.8219 ***	9.3796 ***	9.3796 ***	11.7769 ***
$1/SE$ (H_0: $\beta_1=0$)	0.0354 ***	0.0354 **	0.0498 **	0.0498 ***	0.0434 **
K	179	179	179	179	179
R^2	0.392	0.392	-	-	-

Notes:

[a] Breusch-Pagan test: $\chi^2=29.70$, $p=0.000$

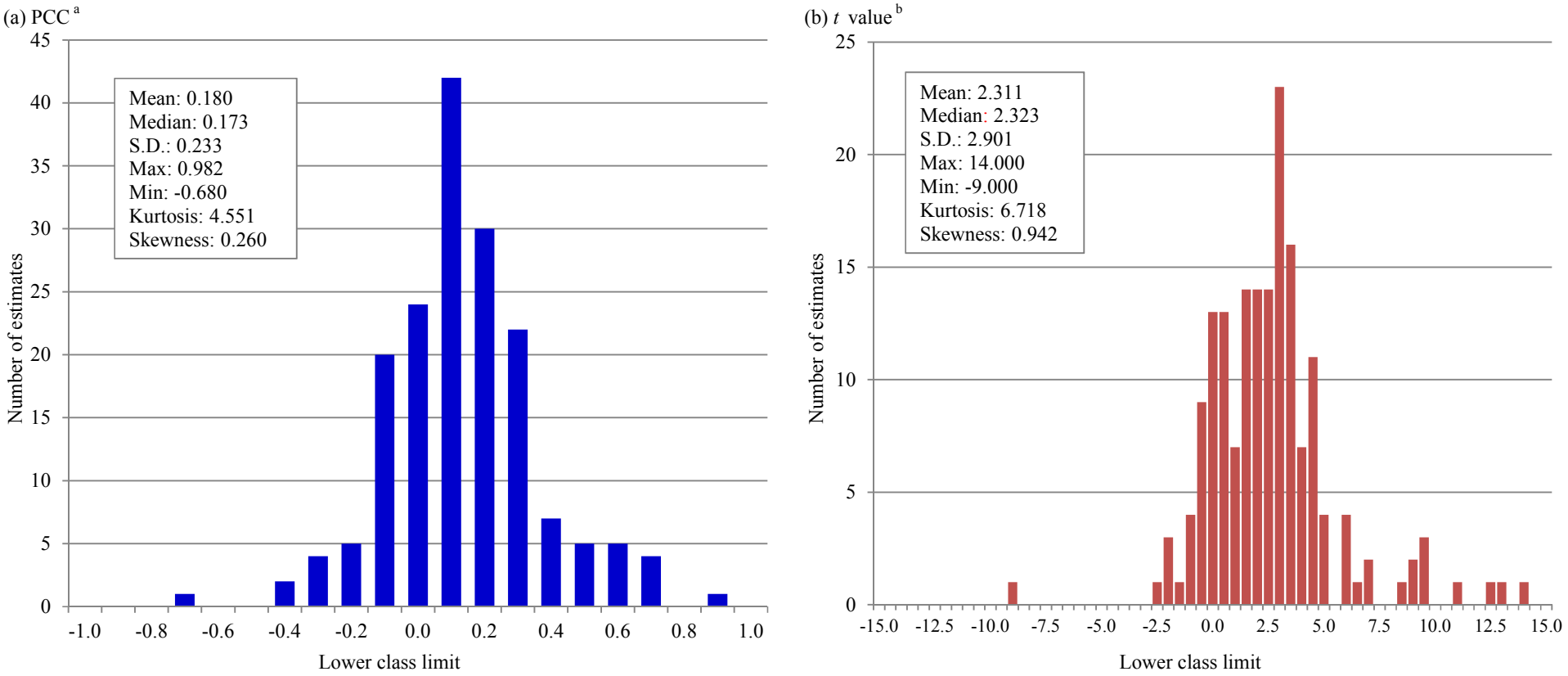
[b] Hausman test: $\chi^2=4.97$, $p=0.026$

[c] Breusch-Pagan test: $\chi^2=47.08$, $p=0.000$

[d] Hausman test: $\chi^2=2.15$, $p=0.139$

Robust standard errors are used for hypothesis testing except for Model [14]. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Figure 8. Distribution of partial correlation coefficients and *t* values of the collected estimates of macroeconomic impacts of FDI (*K* =172)

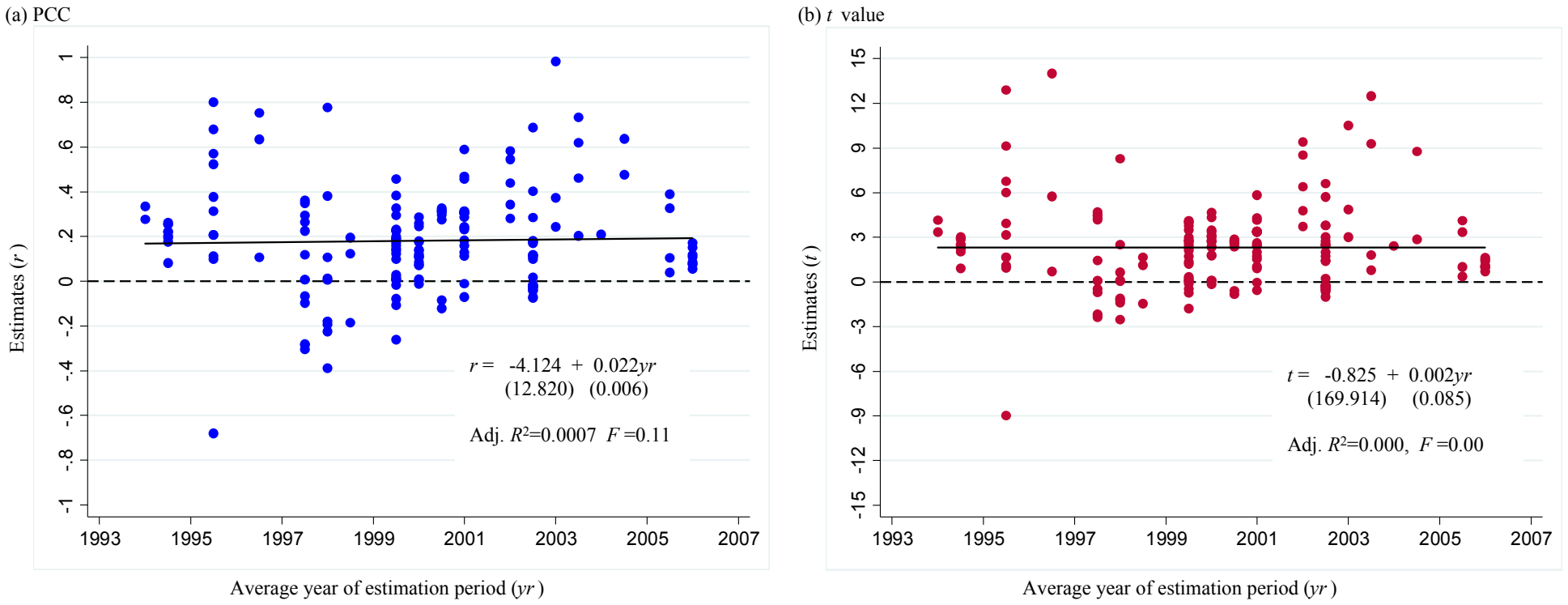


Notes:

[a] Shapiro-Wilk normality test: $V=3.808$, $p=0.001$

[b] Shapiro-Wilk normality test: $V=11.985$, $p=0.000$

Figure 9. Chronological order of partial correlation coefficients and t values of the collected estimates of macroeconomic impacts of FDI (K=172)



Note: Figures in parentheses beneath the regression coefficients of the approximate straight line are robust standard errors. ** and * denote statistical significance at the 5% and 10% levels, respectively.

Table 5. Synthesis of collected estimates of macroeconomic impacts of FDI

	Number of estimates (K)	(a) Synthesis of PCCs			(b) Combination of t values			
		Fixed-effect model [a]	Random-effects model [a]	Test of homogeneity [b]	Unweighted combination	Weighted combination	Median of t values	Failsafe N *(fsN)*
All studies	172	0.184 ***	0.186 ***	1313.218 ***	30.303 ***	5.601 ***	2.323	58194
(a) Comparison in terms of data type								
Studies that employ panel data	138	0.155 ***	0.163 ***	856.384 ***	24.701 ***	4.447 ***	2.300	30977
Studies that employ time series data	34	0.406 ***	0.280 ***	261.071 ***	18.392 ***	3.847 ***	2.412	4216
(b) Comparison in terms of the benchmark index of macroeconomic variable								
Studies that use GDP as the benchmark index of macroeconomic variable	115	0.198 ***	0.184 ***	859.940 ***	22.819 ***	4.820 ***	1.798	22014
Studies that use a non-GDP index	57	0.168 ***	0.188 ***	446.130 ***	20.227 ***	3.081 ***	2.500	8561
(c) Comparison in terms of the type of macroeconomic variable								
Studies that adopt the level of output volume	43	0.357 ***	0.268 ***	300.953 ***	20.359 ***	4.440 ***	2.413	6543
Studies that adopt the change in output volume	42	0.201 ***	0.191 ***	580.521 ***	17.885 ***	4.481 ***	2.649	4923
Studies that adopt the level of productivity	67	0.153 ***	0.179 ***	136.689 ***	17.862 ***	2.687 ***	2.450	7832
Studies that adopt the change in productivity level	20	0.005	0.005	17.907	0.403	0.081	-0.250	-19
(e) Comparison in terms of FDI variable								
Studies that use FDI to GDP ratio	37	0.147 ***	0.141 ***	125.654 ***	11.044 ***	2.246 **	2.444	1631
Studies that use cumulative investment value	32	0.342 ***	0.337 ***	361.724 ***	25.918 ***	4.508 ***	2.950	7912
Studies that use annual capital inflow	54	0.220 ***	0.182 ***	401.535 ***	14.538 ***	3.372 ***	1.678	4164
Studies that use other types of FDI variable	49	0.106 ***	0.116 ***	183.918 ***	10.970 ***	1.685 **	1.430	2130

Notes:

[a] Null hypothesis: The synthesized effect size is zero.

[b] Null hypothesis: Effect sizes are homogeneous.

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6. Name, definition, and descriptive statistics of meta-independent variables used in meta-regression analysis of heterogeneity among studies of macroeconomic impacts of FDI

Variable name	Definition	Descriptive statistics		
		Mean	Median	S.D.
Proportion of CEE 10 EU countries	Proportion of CEE 10 EU countries in target countries [a]	0.674	0.857	0.385
Proportion of other CEE countries	Proportion of other CEE countries in target countries	0.180	0.100	0.294
Proportion of non CEE and FSU counries	Proportion of non CEE and FSU countries in target countries	0.008	0.000	0.034
First year of estimation	First year of estimation period	1994.744	1995	2.806
Length of estimation	Years of estimation period	11.686	11.5	3.638
Time series data	1 = if time series data is employed for empirical analysis, 0 = otherwise	0.198	0	0.399
OLS	1 = if ordinary least squares estimator is used for estimation, 0 = otherwise	0.250	0	0.434
Non-GDP index	1 = if non-GDP index is used as macroeconomic variable, 0 = otherwise	0.331	0	0.472
Changes	1 = if macroeconomic variable is expressed in change rate, 0 = otherwise	0.360	0	0.482
Productivity	1 = if macroeconomic variable is measured in productivity, 0 = otherwise	0.506	1	0.501
Cumulative investment value	1 = if cumulative investment value is used as the type of FDI variable, 0 = otherwise	0.186	0	0.390
Annual capital inflow	1 = if annual capital inflow is used as the type of FDI variable, 0 = otherwise	0.314	0	0.465
FDI to gross value added	1 = if FDI to gross value added ratio is used as the type of FDI variable, 0 = otherwise	0.087	0	0.283
FDI to gross fixed capital formation	1 = if FDI to gross fixed capital formation ratio is used as the type of FDI variable, 0 = otherwise	0.006	0	0.076
Cumulative FDI per capita	1 = if cumulative FDI per capita (or worker) is used as the type of FDI variable, 0 = otherwise	0.140	0	0.348
Growth rate	1 = if growth rate is used as the type of FDI variable, 0 = otherwise	0.012	0	0.108
Other FDI variables	1 = if other FDI variable is used, 0 = otherwise	0.041	0	0.198
$\sqrt{}$ Degree of freedom	Root of degree of freedom of the estimated model	11.752	11.045	5.279
Quality level	Ten-point scale of the quality level of the study [b]	4.953	5	2.181

Notes:

[a] CEE EU countries denote the 10 Central and Eastern European countries that joined the European Union either in 2004 or 2007.

[b] See Appendix A of Iwasaki and Tokunaga (2014) for more details.

Table 7. Meta-regression analysis of heterogeneity among studies of macroeconomic impacts of FDI

(a) Dependent variable — PCC

Estimator (Analytical weight in parentheses)	Cluster-robust OLS	Cluster-robust WLS [Quality level]	Cluster-robust WLS [N]	Cluster-robust WLS [1/SE]	Multilevel mixed effects RML	Random-effects panel GLS	Fixed-effects panel LSDV
Meta-independent variable (Default) / Model	[1]	[2]	[3]	[4] [a]	[5]	[6] [b]	[7] [c]
Composition of target countries (FSU)							
Proportion of CEE 10 EU countries	0.124	0.040	0.142	0.163	0.065	0.056	-0.010 *
Proportion of other CEE countries	0.266	0.200	0.225	0.230 *	0.199 **	0.177 **	0.109 ***
Proportion of non CEE and FSU countries	0.752	1.143 *	-0.020	0.994	0.336	0.105	-1.178 ***
Estimation period							
First year of estimation	-0.008	-0.006	-0.007	-0.009	0.003	0.008	0.043 ***
Length of estimation	0.007	0.010	0.008	0.007	0.000	0.000	0.027 ***
Data type (Panel data)							
Time series data	-0.136	-0.026	-0.113	0.101	-0.035	-0.025	dropped
Estimator (non-OLS estimators)							
OLS	-0.090	-0.084	-0.044	-0.018	0.020	0.036	0.035 *
Benchmark index of macroeconomic variable (GDP)							
Non-GDP index	0.038	0.049	0.101	-0.173 **	-0.041	-0.051	dropped
Type of macroeconomic variable							
Changes (Level)	-0.185 **	-0.191 **	-0.192 **	0.082	-0.104	-0.085	dropped
Productivity (Output)	-0.094	-0.054	-0.114	0.142	-0.078	-0.085	dropped
Type of FDI variable (FDI to GDP)							
Cumulative investment value	0.195 *	0.176 *	0.069	0.488 ***	0.128	0.091	0.068 ***
Annual capital inflow	-0.009	-0.012	-0.023	0.090	-0.068	-0.079	-0.023 ***
FDI to gross value added	0.037	0.013	-0.054	0.380 ***	0.063	0.058	dropped
FDI to gross fixed capital formation	0.124	0.126	0.033	0.381 **	0.113	0.083	-0.073 ***
Cumulative FDI per capita	-0.137 *	-0.149 **	-0.159 **	-0.038	-0.136 *	-0.118	-0.105 **
Growth rate	0.621 ***	0.673 ***	0.595 ***	0.489 **	0.431 **	0.380 *	dropped
Other FDI variables	0.009	0.077	-0.033	0.188	0.082	0.121	0.311 ***
Degree of freedom and research quality							
√Degree of freedom	-0.007	-0.006	-0.004 **	-0.008 *	-0.006 ***	-0.006 ***	-0.007 ***
Quality level	-0.011	-	-0.022	-0.020	-0.005	-0.003	dropped
Intercept	16.884	12.583	15.127	17.178	-6.188	-15.515	-86.232 ***
K	172	172	172	162	172	172	172
R^2	0.296	0.417	0.370	0.457	-	0.154	0.001

(b) Dependent variable — t value

Estimator (Analytical weight in parentheses)	Cluster-robust OLS	Cluster-robust WLS [Quality level]	Cluster-robust WLS [N]	Cluster-robust WLS [1/SE]	Multilevel mixed effects RML	Random-effects panel GLS	Fixed-effects panel LSDV
Meta-independent variable (Default) / Model	[8]	[9]	[10]	[11] [a]	[12]	[13] [d]	[14] [c]
Composition of target countries (FSU countries)							
Proportion of CEE 10 EU countries	1.725	0.383	1.763	0.574	1.031	0.849	0.129
Proportion of other CEE countries	2.180	1.626	2.737	0.122	1.892	1.846	2.197 ***
Proportion of non CEE and FSU countries	6.415	11.363	-2.495	-3.979	2.033	-0.154	-1.400
Estimation period							
First year of estimation	-0.063	-0.022	-0.063	-0.127	0.014	0.065	0.407 ***
Length of estimation	0.076	0.140	0.093	0.137	-0.011	-0.024	0.216 ***
Data type (Panel data)							
Time series data	-1.770	-0.416	-1.175	0.025	-1.049	-0.999	dropped
Estimator (non-OLS estimators)							
OLS	-0.981	-0.537	-0.103	-0.691	0.163	0.447	0.704
Benchmark index of macroeconomic variable (GDP)							
Non-GDP index	0.755	0.663	1.312	-2.474 **	0.044	-0.051	dropped
Type of macroeconomic variable							
Changes (Level)	-1.853 *	-2.098 **	-2.352 **	1.643	-1.001	-0.768	dropped
Productivity (Output)	-1.755 *	-1.407 *	-1.972 **	0.764	-1.655	-1.788	dropped
Type of FDI variable (FDI to GDP)							
Cumulative investment value	2.714 *	2.255 *	0.977	7.739 ***	1.970	1.288	-1.233 ***
Annual capital inflow	0.188	-0.328	-0.504	0.320	-0.467	-0.656	0.429 ***
FDI to gross value added	0.580	0.484	-0.047	5.591 ***	0.803	0.711	dropped
FDI to gross fixed capital formation	1.562	1.491	0.350	6.027 ***	1.668	1.140	1.296 ***
Cumulative FDI per capita	-0.995	-1.192	-1.949 *	0.385	-1.420	-1.333	0.200 **
Growth rate	5.493 **	6.047 ***	5.190 **	3.738	3.700	2.996	dropped
Other FDI variables	-0.164	0.494	-1.049	1.877	0.102	0.465	2.572 ***
Degree of freedom and research quality							
√Degree of freedom	0.032	0.024	0.030	0.006	0.041	0.037	0.012
Quality level	-0.186	-	-0.366	-0.369	-0.121	-0.085	dropped
Intercept	127.138	45.703	129.001	252.693	-24.512	-126.833	-813.363 ***
K	172	172	172	162	172	172	172
R^2	0.313	0.429	0.364	0.498	-	0.193	0.042

Notes:

[a] Excluding 10 estimates collected from Varamini and Kalash (2010) that report only t values of their estimation results.

[b] Breusch-Pagan test: $\chi^2=1.87$, $p=0.086$

[c] Hausman test: $\chi^2=27.79$, $p=0.006$

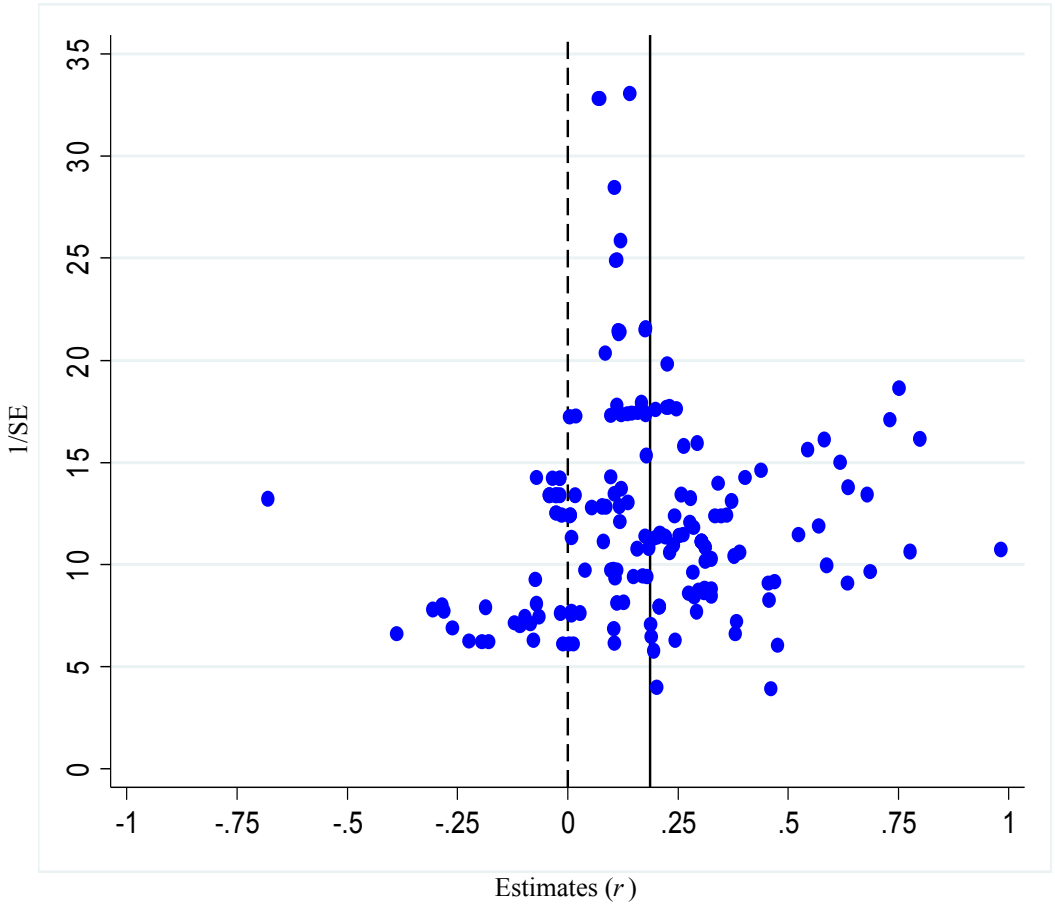
[d] Breusch-Pagan test: $\chi^2=1.51$, $p=0.109$

[e] Hausman test: $\chi^2=17.79$, $p=0.087$

Robust standard errors are used for hypothesis testing. ***, **, and * denote statistical significance of the regression coefficient at the 1%, 5%, and 10% levels, respectively.

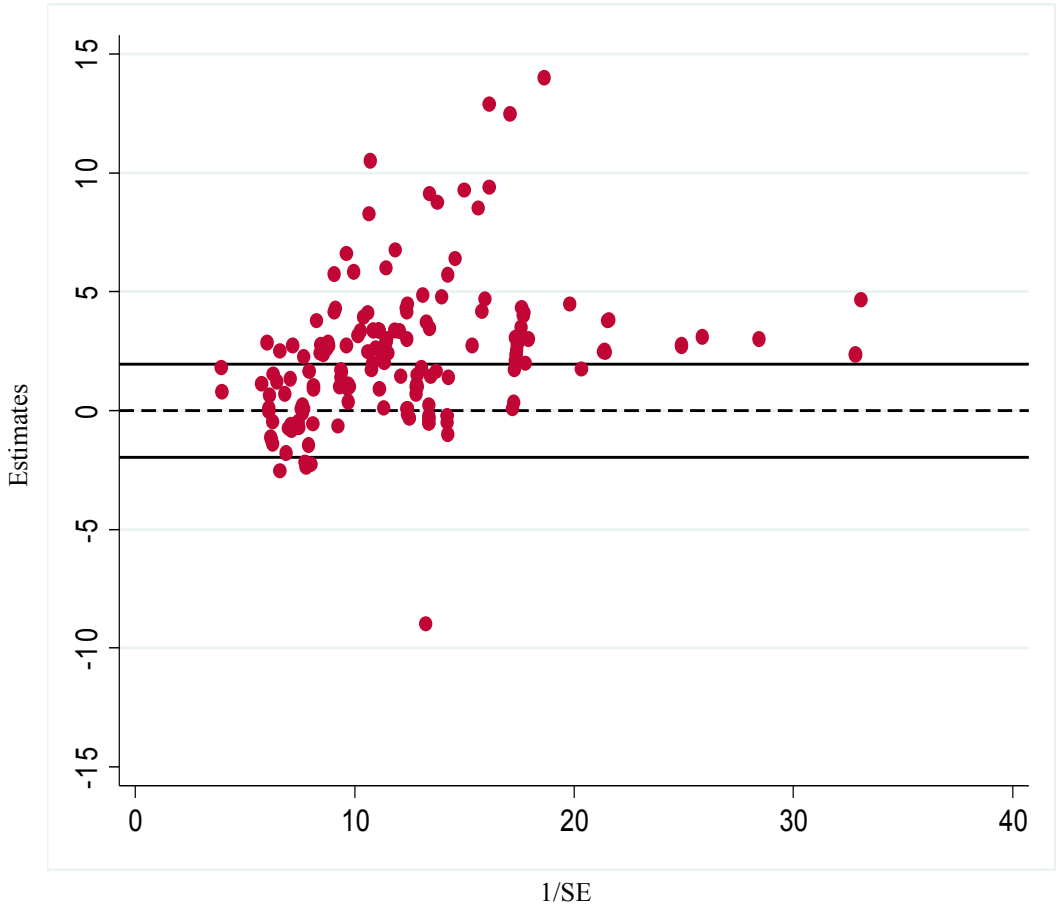
Source: See Table 6 for definition and descriptive statistics of meta-independent variables.

Figure 10. Funnel plot of partial correlation coefficients of collected estimates of macroeconomic impacts of FDI (K=172)



Note: Solid line indicates the synthesized value of 0.186 obtained from the random-effects model reported in Table 5.

Figure 11. Galbraith plot of t values collected estimates of macroeconomic impacts of FDI (*K* =172)



Note: Solid lines indicate the thresholds of two-sided critical values at the 5% significance level ±1.96.

Table 8. Meta-regression analysis of publication selection in the studies on macroeconomic impacts of FDI

(a) FAT (Type I PSB)-PET test (Equation: $t=\beta_0+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Model	[1]	[2]	[3]	[4] [a]	[5] [b]
Intercept (FAT: H_0: $\beta_0=0$)	0.2705	0.2705	0.9080	1.0609	0.7172
$1/SE$ (PET: H_0: $\beta_1=0$)	0.1653 ***	0.1653 **	0.1624	0.1559	0.1291 **
K	172	172	172	172	172
R^2	0.089	0.089	-	0.089	0.105

(b) Test of type II PSB (Equation: $|t|=\beta_0+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Model	[6]	[7]	[8]	[9] [c]	[10] [d]
Intercept (H_0: $\beta_0=0$)	1.1951 ***	1.1951 *	1.3347	1.3900	0.7853
$1/SE$	0.1240 ***	0.1240 *	0.1680	0.1666	0.1572
K	172	172	172	172	172
R^2	0.067	0.067	-	0.067	0.067

(c) PEESE approach (Equation: $t=\beta_0 SE+\beta_1(1/SE)+v$)

Estimator	OLS	Cluster-robust OLS	Multi-level mixed effects RML	Random-effects panel ML	Population-averaged panel GEE
Model	[11]	[12]	[13]	[14]	[15]
SE	-0.7252	-0.7252	1.3113	1.3113	0.7752
$1/SE$ (H_0: $\beta_1=0$)	0.1879 ***	0.1879 ***	0.2083 **	0.2083 ***	0.2104 ***
K	172	172	172	172	172
R^2	0.443	0.443	-	-	-

Notes:

[a] Breusch-Pagan test: $\chi^2=100.27$, $p=0.000$

[b] Hausman test: $\chi^2=0.89$, $p=0.345$

[c] Breusch-Pagan test: $\chi^2=164.78$, $p=0.000$

[d] Hausman test: $\chi^2=0.26$, $p=0.611$

Robust standard errors are used for hypothesis testing except for Model [14]. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.