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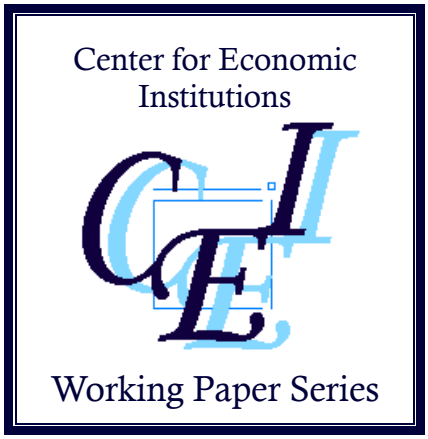

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Ownership Concentration and Firm Performance in European Emerging Economies: A Meta-Analysis[†]

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Abstract: This paper aims to perform a large-scale meta-analysis to examine the relationship between ownership concentration and firm performance in emerging economies of Central and Eastern Europe and the former Soviet Union. A meta-synthesis of 1517 estimates collected from 69 previous studies indicated the presence of a statistically significant and positive effect of ownership concentration on firm performance. The synthesized effect size, however, is only modest at best. A meta-regression analysis conducted to identify the factors underlying the small effect size revealed that differences in target industries, estimation periods, design of ownership variables, data sources, estimators, and choices of control variables could have had systematic and profound effects on the empirical results presented in previous studies. We have also noted that publication selection bias is strongly suspected in this research field, and that, due to the magnitude of this bias, existing studies cannot be expected to provide genuine evidence regarding the effect of ownership concentration on firm performance in European emerging economies. Further empirical studies are required to identify the true effect in this region.

JEL classification numbers: D22, G32, G34, L25, P21, P31

Keywords: ownership concentration; enterprise restructuring; firm performance; European emerging economies; meta-analysis; publication selection bias

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1 Introduction

It is not an overstatement to say that the relationship between the ownership structure and management activities of business organizations is a research topic that has attracted a great deal of attention in the fields of corporate finance and organizational economics. There are, of course, various aspects of the relationship between these two elements. The issue of how concentrated ownership in the hands of a specific shareholder or a group of shareholders could affect the performance of the firm in question, in particular, has been the subject of heated debate among researchers for decades and remains a topic of vigorous research today.

The primary reason for the continuing interest in this field can be explained as follows: After their careful observation of US firms, Berle and Means (1932) addressed the issue of the ways in which companies should be managed in the face of stock ownership dilution; however, the fact remains that the most prevalent mechanism of corporate governance in the world today is based on dominant shareholding and block ownership by major investors, such as government funds and wealthy families (Shleifer and Vishny, 1997). Thus, in many countries where there is no legal system that adequately protects ownership rights and minority shareholders, it is quite common for even the best-performing firms to have a highly concentrated ownership structure (La Porta et al., 1999). In fact, many researchers agree that the voting rights exercised by large shareholders or informal talks between managers and a dominant corporate owner(s) decisively impact the management of firms, and that unless this problem is addressed, there is no way to gain a true picture of the world's corporate governance activities.

Another reason behind the growing academic interest in this issue is that studies addressing the effect of ownership concentration on firm performance is "*theoretically complex and empirically ambiguous*" (Earle et al., 2005, p. 254). As a result, the academic debate over this issue has remained inconclusive to date, despite a mass of research works accumulated over recent years. There is a compelling argument that the presence of large shareholders who have a strong incentive to monitor and discipline the managers of the firm can help avoid the traditional "free-rider" problem associated with ownership dispersion, thus improving firm performance (Shleifer and Vishny, 1986). This argument is, however, fiercely refuted by Claessens et al. (2000), who pointed out that, because large shareholders exercise control to maximize their profits, they can lead the firm to sacrifice other shareholders and employees, risking damage to the firm's corporate value. Thus, the theoretical debate over the effect of ownership concentration on firm performance has swung widely between the alignment hypothesis and the exploitation hypothesis.[1]

[1] For details about the academic debate on the effect of ownership concentration, see Wang and Shailer (2015). In addition, focusing on the management of Russian firms during financial crisis, Iwasaki (2016) theoretically addressed the virtues and vices of large shareholding.

In line with the above theoretical debates, the empirical results presented by previous studies are also diverse in their content and views. In fact, even studies recently published on the topic in both developed and developing economies[2] are more or less equally divided between two extremes: those presenting empirical findings supporting the alignment hypothesis (Ma et al., 2010; Cabeza-García and Gómez-Ansón, 2011; Galve-Górriz and Hernández-Trasobares, 2015; da Cunha and Bortolon, 2016) and those presenting findings to the contrary (Omran et al., 2008; Setia-Atmaja, 2009; Weiss and Hilger, 2012; Bednarek and Moszoro, 2014). Furthermore, although a certain amount of attention has been given to both the potential nonlinearity between ownership concentration and firm performance and the endogeneity between the degree of ownership concentration and firm performance, the conclusions reached by preceding empirical works are widely divergent (Hu and Izumida, 2008; Omran, 2009; Gul et al., 2010).

In emerging economies in Central and Eastern Europe (CEE) and the former Soviet Union (FSU), their financial markets are generally immature with no adequate legal framework in place to protect ownership rights and minority shareholders (Baumöhl et al., 2018; Kočenda and Iwasaki, 2018). This is exactly why policy makers and researchers expected large shareholders to take an active role in effectively monitoring and disciplining top management in the former state-owned privatized enterprises. At the same time, however, many researchers cited growing concerns about the potential opportunistic and rent-seeking behavior of new entrepreneurs and wealthy individuals that became apparent during the period of transition, which is why many of the previous studies of CEE/FSU countries sought to verify the correlation between ownership concentration and firm performance.

In fact, in addition to the previous work by Claessens and Djankov (1999), Filatotchev et al. (2001), and Earle et al. (2005), which explicitly addressed the effect of concentrated ownership on firm performance, a plethora of empirical studies have investigated the association between corporate ownership structure and firm performance during the post-privatization period by using dummy variables for large shareholders, the ownership share held by the leading shareholders, and other related variables in an attempt to verify how the ownership concentration affects firm performance and enterprise restructuring activities. However, as is the case with studies of developed and developing economies, the transition literature has so far failed to yield any conclusive results on this topic. Not only that, this trend seems to become even more pronounced as more empirical evidence is reported on this aspect.

In this paper, we present a large-scale meta-analysis encompassing empirical results reported in existing studies that investigated the relationship between concentrated ownership and firm

[2] This includes studies on corporate governance in Chinese companies.

performance in CEE and FSU countries[3]. In the field of transition economics, this is the first attempt to address this crucial issue by meta-analysis.[4] Here we adopt the advanced meta-analytic technique advocated by Stanley and Doucouliagos (2012) to answer the following two questions: How does the current body of relevant literature evaluate the effect of ownership concentration on firm performance in European emerging markets as a whole? Do the extant studies contain genuine evidence of the true effect beyond the possible publication selection bias?

A meta-synthesis of 1517 estimates collected from 69 relevant studies indicated a statistically significant and positive effect of ownership concentration on firm performance in CEE and FSU countries. The synthesized effect size, however, was only modest at best. A meta-regression analysis of heterogeneity in the existing literature to identify factors underlying the small effect size revealed that differences in target industries, estimation periods, design of the ownership variables, data sources, estimators, and choices of control variables could have had systematic and profound effects on the empirical results presented in previous studies. We also found that publication selection bias is strongly suspected in this research field, and that, due to the magnitude of this bias, existing studies do not contain genuine evidence regarding the effect of ownership concentration on firm performance in European emerging markets.

Wang and Shailer (2015) presented an earlier meta-study on the relationship between ownership concentration and firm performance.[5] The meta-analysis performed in their study covered 42 papers published during a period from 1999 to 2010 that investigated listed companies in a total of 18 emerging markets.[6] These 42 studies barely overlap with the literature dealt with in the present work, which was published between 1997 and 2017 and focused on privatized firms in CEE/FSU countries. Furthermore, we incorporated 1517 estimates into our meta-analysis, which is approximately 3.6 times the number of estimates used in Wang and Shailer (2015) (i.e., 419 estimates). While Wang and Shailer (2015) demonstrated the negative impact of ownership concentration on firm performance, our study shows a positive correlation between the two, as mentioned above. The different conclusions reached by our study and by Wang and Shailer (2015) could be due to differences in the studies utilized in the meta-analysis. In this sense, we could say that the findings of our study and those of theirs could complement each other.

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[3] Hanousek et al. (2015) examined corporate efficiency in old and new Europe and concluded that majority ownership does not ensure efficiency.

[4] The question of how differences in the types of owners and privatization methods employed can affect firm performance in transition economies has been examined by Iwasaki and Mizobata (2018) by using a meta-analysis approach similar to the one described herein.

[5] A meta-analysis conducted by Heugens et al. (2009), on the other hand, included only studies focusing on companies in Asia.

[6] These emerging markets include 14 counties in South America, Asia, the Middle East, and Africa and the four CEE/FSU countries (i.e., the Czech Republic, Hungary, Poland, and Russia).

The rest of this paper is structured as follows: The next section overlooks the historical process of emergence of large shareholders in CEE and FSU countries in the transition period. Section 3 describes the procedure used to select the literature and the meta-analysis methodology. Section 4 overviews the literature subject to the meta-analysis. Section 5 presents a meta-synthesis of collected estimates, while Section 6 performs a meta-regression analysis of heterogeneity among studies. Section 7 tests the publication selection bias in this research field and, finally, Section 8 summarizes the major findings and concludes the paper.

2 Emergence of Large Shareholders in CEE and FSU Countries

During the transition from a socialist economy to a capitalist economy, the protection of ownership rights has become a vital condition for marketization (Frye, 2017). The enactment of company laws and the legalization of joint-stock companies and other types of business corporations have become a base of ownership structure. The degree of ownership concentration can be determined by owned share sizes, such as largest shareholder, control shareholder, block shareholder, and minority shareholder. Therefore, ownership transfer and privatization were carried out, parallel with institutional formation, and it is natural that corporate control market and ownership infringements simultaneously emerged due to the delay in building institutions. Prior to their joining the EU, CEE countries built their own rules; later, those rules were obliged to adapt the EU standard. In FSU countries, this legal adaptation was delayed. For instance, Russia started its legal evolution after 1995, when the first stage in the process of privatization had already been completed by the issue of vouchers. In addition, the laws required frequent amendments until the mid-2000s (Mizobata, 2005; Iwasaki, 2007). In short, ownership transfer and the formation of corporate market control were based on the absence of stable rules (Hoffman, 2011), and privatization started with ownership concentration and the formation of large shareholders.

In most transition economies, the privatization policy affected the shift from the state to private hands and then enhanced ownership concentration (Gabrisch and Hölscher, 2006). The phenomena can be observed both in CEE and FSU countries. For example, Frydman et al. (2006) observed that the overwhelming majority of privatized firms had a very concentrated ownership structure, and, based on a survey of manufacturing firms in Central Europe in the fall of 1994, they identified the firm's ownership with its largest shareholder. The result applied both insider-controlled and outsider-controlled and domestic capital-led and foreign-led companies. In Russia in 2010, "about 60 percent of the largest companies had a single shareholder holding a majority stake" (Enikolopov and Stepanov, 2013, p. 223).

First, many countries executed voucher privatization. Generally speaking, this measure causes

the dispersion of ownership due to the wide-ranging distribution of shares. In reality, however, the process is vastly different from the initial view of mass privatization. Insiders were given privileges in acquiring shares, and shares were acquired by firms' in-house application process due to a lack of share trading. Moreover, there was information asymmetry between insiders and outsiders, and insiders—such as management and employees—had a dominant and advantageous position, as compared to outsider dispersed shareholders, particularly minority shareholders. In addition, as voucher privatization usually entailed an additional redistribution/privatization stage, strategic shareholders with concentration potential were given priority. In the case of management and/or employee buy-outs (MEBO), insiders easily concentrated their shares. On the other hand, in the case of direct sales, large investors and foreign capitals had strong investment power and were given priority (Iwasaki and Mizobata, 2018).

CEE and FSU countries adopted their own specific measures for privatization.[7] Russia utilized the specific method of "loans for shares," and other transition economies also swapped shares for loans. In any cases, particular big companies and banks gained shares in exchange for debts, and they sought ownership concentration for their group formation. The above method became an important path for creating "oligarchs," and privatization methods ultimately concentrated assets in a single private hand. Therefore, when privatization has brought about efficient firm performance, privatization has affected ownership concentration. In the post-privatization process, however, minority shareholders have been given attention, and we can observe an increase in dispersion and a decline in concentration.

Ownership concentration has been enhancing in the transition economies, and ownership concentration showed itself in the organization of firms. In Russia, financial-industrial groups (business groups) and trusts were officially and legally organized "with a captive bank, a holding company, and multiple privatized companies as subsidiaries" (Fox and Heller, 2006, p. 186). Oligarchs had emerged on the basis of their linkage with the government. Given the extreme weakness of Russian capital markets, the above groups and oligarchs found alternative financing paths by themselves, and they were optimistically regarded as resembling the *Keiretsu* in Japan and the *Chaebol* in Korea (Fox and Heller, 2006). In any case, such business groups were built on a pyramid ownership structure similar to a family business, further enhancing ownership concentration. Moreover, large shareholding that prevented hostile takeovers also became a cause and a result of the ownership concentration. At the very least, concentrated ownership and the dominance of large business groups were responses to multiple market and government failures.

[7] Concerning the privatization methods in CEE and FSU, Iwasaki and Mizobata (2018) illustrated country specificity and its efficiency. In contrast to CEE/FSU countries, China gradually changed its corporate structure, particularly the enactment of corporate law, in 1994, and has maintained state control in key industries and state restrictions over private ownership.

As a result of the market transition, in the 2000s, majority shareholders controlled the vast majority of firms (Lazareva et al., 2007). This explains why the firm model in the transition economies, the shareholder primacy model, is different from the Anglo-Saxon model, which is based on the separation of ownership and control.

Given that most major firms in transition countries are based on the control of large shareholders, then the question is how concentrated ownership affects their performance. In a socioeconomic environment in which the property rights of institutions have not sufficiently functioned, ownership concentration is a second-best response to weak institutions. In other words, "concentration of ownership serves as a substitute to the poor legal protection of shareholders. Under weak legal protection only a large owner has enough power and incentives to ensure that he is not expropriated by the management or other large owners" (Lazareva et al., 2007, p.14). Moreover, when managers themselves become large shareholders, they are strongly motivated to maximize their profits (the alignment effect). Therefore, we expect a positive effect of ownership concentration on firm performance in CEE and FSU countries.

However, the concentration of ownership may have a negative impact on firm performance. It has been argued that the concentration of control rights is likely to stimulate large shareholders to expropriate the holdings of minority shareholders, and their excessive monitoring of managers demotivates management. When managers have become large shareholders, management discipline becomes lax due to declining pressure from other shareholders (the entrenchment effect). In addition, ownership concentration decreases firm asset liquidity and has become an obstacle for the diversification of assets.

For example, the Czech Republic and China have shown a contrast in the ownership concentration effect. With regard to the Czech Republic, Kočenda and Hanousek (2013) made clear the presence of a pyramid structure of corporate ownership and control under the strong influence of the government. Given this fact, Konečný and Částek (2016) found that ownership concentration does not necessarily bring about efficient control in Czech companies, and Hanousek et al. (2007) emphasized the effects of concentrated foreign ownership. In contrast, Ma et al. (2006) verified that, in China, ownership concentration leads to the efficient monitoring of group members. Moreover, according to Ma et al. (2010), in China, the ownership concentration effect occurs independently of the type of large shareholder. Besides, Earle et al. (2005) verified the concentration effect using a single block shareholder in Hungary.

We should note, in this regard, that ownership concentration may have a nonlinear effect on firm performance: When ownership is concentrated in the hands of insiders, insiders have sought efficient management based on consistency in ownership and management. However, when insiders have assumed dominant positions, they may ignore minority shareholders, and pressure

from outside stakeholders has been shut out. Then, a large shareholder may abuse management at the cost of other shareholders. Moreover, when a large shareholder has complete ownership, a shareholder must manage efficiently to maintain control (Earle et al., 2005). Particularly, in transition economies, rules of corporate governance have been weakened, and the minority shareholder expropriation effect is high. Actually, Balsmeier and Czarnitzki (2015) certified an inverse U-shaped effect of ownership concentration in 28 transition economies. Hanousek et al. (2007) also strongly demonstrated this. In sum, the low concentration causes a classic agency problem, and we can observe private profit from control as the concentration becomes stronger.

In the following sections, we will conduct a meta-analysis of the ownership concentration effect on firm performance in CEE and FSU countries, keeping the above arguments in mind.

3 Literature Selection Procedure and Meta-Analysis Methodology

In this section, we will first describe the procedure used for selecting the literature and then explain the methodology of the meta-analysis adopted in this paper.

As a first step toward identifying literature that has empirically examined the impacts of ownership concentration on firm performance in CEE and FSU countries, we used EconLit and Web of Science databases of academic literature to search for studies published during the 27-year period between 1989 and 2017. The final literature search was performed in January 2018. When using these electronic databases, we employed as search terms combinations of one of *privatization*, *ownership*, *restructuring*, or *firm performance* and one of *transition economies*, *Central Europe*, *Eastern Europe*, *former Soviet Union*, or the actual name of a CEE or FSU country. This generated around 900 hits. We also tried to obtain as many similar research works as possible that were published during the same period from among the non-duplicated studies cited in the literature retrieved from the databases. As a result, we obtained more than 1,000 publications, which contain a large number of unempirical research works.

Therefore, as a next step, we closely examined the contents of these works and limited our literature list to those containing estimates that could be subjected to meta-analysis in this paper.[8] We did 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/industries, data type and source,

[8] In the selection of literature, we did not perform a so-called "self-screening," referring to the third-party evaluation of the publication media and the research content that may lead to a kind of publication selection bias. As described later, we have rather adopted the approach of testing the possible influence of differences in research quality on empirical results by meta-regression analysis that adopts a series of meta-independent variables designed to control for various aspects of precedent works.

regression equation, estimation period, and estimator. Hereafter, K denotes the total number of collected estimates (k=1, 2, …, K).

Next we will provide a brief description of the methodology of meta-analysis performed in this study. To synthesize estimates derived from the selected studies we employ the partial correlation coefficient (PCC) and the t value. The PCC is a measure of the association of a dependent variable and the independent variable in question when other variables are held constant. The PCC is calculated in the following equation:

$$r_k = \frac{t_k}{\sqrt{t_k^2 + df_k}}, \quad k = 1, 2, \dots, K, (1)$$

where t_k and df_k denote the t value and the degree of freedom of the k-th estimate, respectively, while K denotes the total number of collected estimates. We synthesize PCCs using the meta fixed-effect model and the meta random-effects model, and according to the homogeneity test, we adopt the synthesized effect size of one of these two models as the reference value.

The t values are combined using the following equation:

$$\overline{T_w} = \sum_{k=1}^{K} w_k t_k \Big/ \sqrt{\sum_{k=1}^{K} w_k^2} \quad \sim \quad N(0,1). \quad (2)$$

Here, w_k is the weight assigned to the t value of the k-th estimate. For the weight w_k in Eq. (2), we utilize a 10-point scale to mirror the quality level of each relevant study $(1 \le w_k \le 10)$.[9] Moreover, we report not only the combined t value $\overline{T_w}$ weighted by the quality level of the study but also the unweighted combined t value $\overline{T_u}$. As a supplemental statistic for evaluating the reliability of the above-mentioned combined t value, we also report Rosenthal's fail-safe N (*fsN*).

Following the synthesis of collected estimates, we conduct MRA to explore the factors causing heterogeneity between selected studies. To this end, we estimate the meta-regression model:

$$y_k = \beta_0 + \sum_{n=1}^{N} \beta_n x_{kn} + e_k, \quad k = 1, 2, \cdots, K, \quad (3)$$

where y_k is the PCC or the t value of the k-th estimate; x_{kn} denotes a meta-independent variable that captures relevant characteristics of an empirical study and explains its systematic variation from other empirical results in the literature; β_n denotes the meta-regression coefficient to be estimated; and e_k is the meta-regression disturbance term. To check the statistical robustness of coefficient β_n, we perform an MRA using the following seven estimators: the cluster-robust ordinary least squares (OLS) estimator, which clusters the collected estimates by study and

[9] For more details on the method of evaluating the quality level of the study, see the **Appendix**.

computes robust standard errors; the cluster-robust weighted least squares (WLS) estimator, which uses either the above-mentioned quality level of the study, the number of observations (*N*), or the inverse of the standard error (1/*SE*) as an analytical weight; the multilevel mixed effects restricted maximum likelihood (RML) estimator; and the cluster-robust unbalanced panel estimator (i.e., fixed-effects estimator and random-effects estimator).

Testing for publication selection bias is a unique and important issue for meta-analysis. In this paper, we examine this problem by using the funnel plot and the Galbraith plot as well as by estimating a meta-regression model that is designed especially for this purpose. If the funnel plot is not bilaterally symmetrical but is deflected to one side, then an arbitrary manipulation of the study area in question is suspected, in the sense that estimates in favor of a specific conclusion (i.e., estimates with an expected sign) are more frequently published (type I publication selection bias). Meanwhile, the Galbraith plot is used for testing another arbitrary manipulation in the sense that estimates with higher statistical significance are more frequently published, irrespective of their sign (type II publication selection bias). In general, the statistic, $|(\text{the } k-\text{th estimate} - \text{the true effect})/SE_k|$, should not exceed the critical value of ±1.96 by more than 5% of the total estimates. In other words, when the true effect does not exist and there is no publication selection, the reported *t* values should vary randomly around zero, and 95% of them should be within the range of ±1.96. The Galbraith plot tests whether the above relationship can be observed in the statistical significance of the collected estimates and thereby identifies the presence of type II publication selection bias.

In addition to the above two scatter plots, we also report estimates of the meta-regression models, which have been developed to examine in a more rigorous manner the two types of publication selection bias and the presence of the true effect.

We can test for type I publication selection bias by regressing the *t* value of the *k*-th estimate on the inverse of the standard error (1/*SE*) using the following equation:

$$t_k = \beta_0 + \beta_1(1/SE_k) + v_k, \quad (4)$$

thereby testing the null hypothesis that the intercept term β_0 is equal to zero. In Eq. (4), v_k is the error term. When the intercept term β_0 is statistically significantly different from zero, we can interpret that the distribution of the effect sizes is asymmetric. For this reason, this test is called the funnel-asymmetry test (FAT). Meanwhile, type II publication selection bias can be tested by estimating the next equation, where the left side of Eq. (4) is replaced with the absolute *t* value:

$$|t_k| = \beta_0 + \beta_1(1/SE_k) + v_k, \quad (5)$$

thereby testing the null hypothesis of $\beta_0 = 0$ in the same way as the FAT.

Even if there is a publication selection bias, a genuine effect may exist in the available

empirical evidence. Stanley and Doucouliagos (2012) propose examining this possibility by testing the null hypothesis that the coefficient β_1 is equal to zero in Eq. (4). The rejection of the null hypothesis implies the presence of a genuine effect. They call this test the precision-effect test (PET). Moreover, they state that an estimate of the publication selection bias–adjusted effect size can be obtained by estimating the following equation that has no intercept:

$$t_k = \beta_0 SE_k + \beta_1 (1/SE_k) + v_k, \quad (6)$$

thereby obtaining the coefficient β_1. This means that if the null hypothesis of $\beta_1 = 0$ is rejected, then the non-zero effect does actually exist in the literature, and the coefficient β_1 can be regarded as its estimate. Stanley and Doucouliagos (2012) call this procedure the precision-effect estimate with standard error (PEESE) approach. To test the robustness of the regression coefficient, we estimate Eqs. (4) to (6) above using not only the OLS estimator but also the cluster-robust OLS estimator and the unbalanced panel estimator, both of which treat possible heterogeneity among the studies.[10]

As mentioned above, we basically follow the FAT-PET-PEESE approach advocated by Stanley and Doucouliagos (2012) as the test procedures for publication selection. However, we also include the test of type II publication selection bias using Eq. (5) because, as repeatedly verified in Iwasaki and Tokunaga (2014; 2016) and Tokunaga and Iwasaki (2017), this kind of bias is very likely in the literature of transition economies.

4 Overview of Studies Selected for Meta-Analysis

Following the literature selection procedure described in the previous section, we selected a total of 69 studies for inclusion in the meta-analysis. **Table 1** lists these selected studies. As shown in this table, although the number of studies that empirically examined the effect of ownership concentration on firm performance in CEE/FSU countries during the 1990s was limited, it grew substantially after the turn of the century. In fact, as many as 27 papers were published during the five years from 2000 to 2004, accounting for 39.1% of all studies included in the meta-analysis. Furthermore, during the periods from 2005 to 2009, from 2010 to 2015 and from 2016 and onward, 16 (23.2% of all selected studies), 17 (24.6%), and 6 papers (8.7%), respectively, were published. This considerable growth is probably attributable to the increased availability of firm-level data and the growing political and academic interest in the dramatic shift toward a highly concentrated

[10] To estimate Eqs. (4) and (5), we use either the cluster-robust random-effects estimator or the cluster-robust fixed-effects estimator according to the results of the Hausman test of the random-effects assumption. We also report the results of the Breusch-Pagan test and F test for reference. With regard to Eq. (6), which does not have an intercept term, we report the random-effects model estimated by the maximum likelihood method.

ownership structure in former state-owned privatized enterprises.

As shown in **Table 1**, the selected literature mostly includes single-country studies, with only 10 cross-national studies. In addition, the frequency of subjection to empirical analysis across countries varies widely. In fact, there are 22 studies for Russia, followed by 19 for the Czech Republic, 11 for Romania, 10 for Estonia, 9 each for Bulgaria and Slovenia, 8 each for Hungary and Poland, and 7 each for Slovakia and Ukraine. Only 5 studies are available for the rest of the CEE/FSU countries. With regard to the target industries, 47 studies cover a broad range of industries, while 23 studies deal with the mining and manufacturing industry, and just 1 study treats the service industry. If the 69 studies are taken as a whole, the estimation period covers a period of 26 years from 1989 to 2014, with a mean estimation period for the collected estimates of 4.7 years (median: 4 years).

The firm performance variables used in the regression model as dependent variables by the selected studies can be broadly categorized into the following six types: (1) sales/output indicators, such as total sales volume and total production value; (2) efficiency indicators, such as return on asset (ROA); (3) productivity indicators, such as labor productivity and total factor productivity; (4) firm value indicators, such as stock price and Tobin's Q; (5) enterprise restructuring activity indicators, such as capital investment; and (6) other firm performance indicators. The percentages of included studies adopting each of these variables are 27.5% (19 of 69 articles), 40.6% (28), 39.1% (27), 23.2% (16), 14.5% (10), and 7.2% (5), respectively.

The ownership variables adopted as independent variables can be categorized into the following three types: (1) variables describing the ownership held by the leading shareholders, including the ownership share held by the largest shareholder, the total ownership share held by leading shareholders, and dummy variables for presence of a controlling/dominant shareholder; (2) variables describing the ownership held by block shareholders (similar to the variables described under (1) above); and (3) variables describing the degree of ownership concentration, such as the Herfindahl index of ownership share. The overwhelming majority of the selected studies adopted variables describing ownership held by leading shareholders (88.4%, or 61 of 69 articles), followed by 29.0% (20) that adopted variables describing ownership held by block shareholders, and 15.9% (11) that adopted variables describing the degree of ownership concentration. The fact that the overwhelming majority of the available empirical studies adopted variables describing ownership held by leading shareholders clearly indicates that there are a number of limitations in the data availability for studies of CEE/FSU companies.

As shown in the farthest right column in **Table 1**, we extracted a total of 1517 estimates from the 69 selected works. The mean of the collected estimates per study (median value) is 22.0 (10). The following sections present a meta-analysis of these collected estimates.

5 Meta-Synthesis

As the first step of meta-analysis, in this section, we will synthesize the collected estimates outlined in the previous section.

Figure 1 shows the distribution of PCCs and *t* values of the collected estimates. As shown in Panel (a) of this figure, the distribution of PCCs shows a high degree of kurtosis, with 0.00 being the most frequently observed value. Thus, the Shapiro-Wilk normality test rejects the null hypothesis at a 1% significance level (W=0.949, z=9.697, p=0.000). According to the observation presented by Doucouliagos (2011) with regard to the evaluation of PCCs used in economic research, 64.4% of the collected estimates (977 estimates) show no practical relationship between ownership concentration and the performance of firms in CEE/FSU countries ($|r| < 0.070$), whereas 28.3% (430) show a small effect of ownership concentration on firm performance ($0.070 \leq |r| < 0.173$), 6.6% (100) indicate the presence of a medium effect ($0.173 \leq |r| < 0.327$), and the remaining 0.7% (10) demonstrate a large effect ($0.327 \leq |r|$).[11] On the other hand, as shown in Panel (b) of **Figure 1**, given that the distribution of *t* values shows a much higher degree of kurtosis than that of the PCCs, with 0.00 being the most frequently observed value, the null hypothesis of normality is again strongly rejected (W=0.798, z=13.154, p=0.000). Furthermore, 37.6% of all estimates (571 estimates) have absolute *t* values of 2.00 or greater. Consequently, only 6.5% of all estimates (98) show not only PCCs that indicate a moderate or greater impact of ownership concentration on firm performance but also absolute *t* values of 2.00 or greater. These findings suggest that the 69 studies listed in **Table 1** must have encountered substantial difficulty in their empirical examination of the relationship between ownership concentration and performance of firms in European emerging markets.

As shown in **Table 1**, the estimation period varies from study to study, which could have affected their empirical results to some extent. **Figure 2**, which plots the collected estimates in chronological order of their average estimation period, shows a downward trend of both the PCCs and the *t* values over time. According to the approximate straight line presented in this figure, with each one-year increase in the average estimation period, the PCC and the *t* value drop by

[11] Cohen (1988), who is frequently cited for assessing correlation coefficients, defines a coefficient of 0.3 as the threshold between a small effect and a medium effect and a coefficient of 0.5 as the threshold between a medium effect and a large effect. Doucouliagos (2011) argues, in this regard, that Cohen's guidelines for zero-order correlations are too restrictive when applied to economics and proposes to use the 25th percentile, 50th percentile (median), and 75th percentile of a total of 22141 PCCs collected by himself as alternative criteria. According to his new guidelines, for general purposes, 0.070, 0.173, and 0.327 are considered to be the lower thresholds for small, medium, and large effects, respectively.

0.0028 and 0.212, respectively, with statistical significance at the 1% level. This downward trend reflects not only heightened market competition and a brutal shakeout of poorly performing firms at a time of economic transition but also a trend of the gradual correction of gaps in the operating activities of firms that had been caused by differences in ownership structure. It can also be attributed to remarkable improvements made in quantitative methods in recent years, which might have enabled more stringent evaluation of the impact of ownership concentration on firm performance. This issue will be addressed in detail in the meta-regression analysis presented later.

Table 2 presents the results from meta-syntheses of the collected estimates. In light of the discussion in the previous section, this table shows not only the results from the synthesis of estimates collected from all studies but also results from meta-syntheses that take into account differences in the target countries/industries, estimation periods, firm performance variable types, and ownership variable types.

Column (a) in **Table 2** shows results from the syntheses of PCCs. In all instances, the homogeneity test rejects the null hypothesis at the 1% level. Hence, we adopt the estimate $\overline{R_r}$ from the random-effects model as a reference value for the synthesized effect size. The synthesized value of PCC for estimates collected from all studies is 0.011, and the null hypothesis that the synthesized effect size is equal to zero is rejected at the 1% level. Thus, overall, the extant studies suggest that ownership concentration can positively and significantly affect firm performance, although the effect size is minimal. On the other hand, the results derived from a comparative analysis of the groups of studies defined by the conditions specified for each research attribute show that differences in study conditions can substantially impact the size of the synthesized value. For example, the synthesized value of PCC for estimates extracted from studies focusing solely on CEE countries is less than that for studies of FSU countries, indicating that the performance effect of ownership concentration on FSU companies may be stronger than in CEE counterparts. In addition, although the synthesized effect size computed for studies that covered a broad range of industries and those that treated the mining and manufacturing industry is significantly positive, the synthesized effect size calculated for studies of the service industry is significantly negative.

Furthermore, as shown in Panel (a) of **Figure 2**, the synthesized effect size of studies whose average estimation periods were before 2000 is smaller by 0.017 than that of studies whose average estimation periods were after 2000. The synthesized effect size of studies that used productivity indicators and enterprise restructuring activity indicators as dependent variables is not statistically significant, while that of other firm performance indicators is significant and negative. More interestingly, we found that differences in the ownership variable type can greatly affect the synthesized value of the PCC. In fact, while the synthesized effect size of studies

adopting variables describing ownership by leading shareholders is 0.013, that of studies accounting for the presence of block shareholders is statistically insignificant; moreover, in the case of studies adopting variables describing the degree of ownership concentration, the synthesized effect size is larger by 0.024 than that of studies using variables that describe ownership by leading shareholders. This finding indicates that the ways in which corporate ownership structure is defined can have a considerable impact on empirical results in the transition literature.

The combined *t* values and the fail-safe numbers (*fsN*) presented in Column (b) of **Table 2** are also in line with the results shown for the synthesized value of PCCs. Namely, the combined *t* value $\overline{T_w}$ weighted for the quality level of the studies is much lower than the unconditionally combined *t* value $\overline{T_u}$, and, in some cases, they do not even reach statistical significance at the 10% level. Therefore, it can be speculated that the findings regarding the effect of ownership concentration on firm performance reported by preceding studies might have been affected considerably not only by differences in study conditions but also by differences in the quality level of these works. These issues also will be addressed in greater detail in the meta-regression analysis presented in the next section.

6 Meta-Regression Analysis

As the second step of meta-analysis, we will estimate Eq. (3) in order to verify whether the results of the meta-synthesis presented in the previous section can be reproduced even when a series of research conditions and the quality level of the previous studies are simultaneously controlled for. To this end, we introduce the PCCs or the *t* values as dependent variables into the left-hand side of the regression equation, while on its right-hand side, we adopt meta-independent variables designed to capture not only the differences in the target countries or other relevant attributes mentioned in Section 4 but also the differences in other characteristics of ownership variables, ownership types, data types and sources, estimators, equation types, the presence of treatment for selection bias of privatized firms that aims to tackle the endogeneity problem between ownership structure and firm performance, the use of various control variables that would significantly affect estimation results, degrees of freedom, and quality of the studies. **Table 3** shows the names, definitions, and descriptive statistics of these meta-independent variables.

Panel (a) of **Table 4** shows the estimation results of the regression model where the PCC is introduced into the left-hand side of Eq. (3). Panel (b) of the same table presents results in which the *t* value is used as a dependent variable. As this table illustrates, estimates derived from meta-independent variables are generally sensitive to the choice of the estimator. Assuming that meta-independent variables (those presented in each of the panels mentioned above) that are statistically

significant and have the same sign in at least four of the seven models constitute statistically robust estimation results, we can make the following six observations about factors that may be contributing to the systematic heterogeneity across studies in this research field.

First, as compared to estimates on the effect of ownership concentration on firm performance derived from studies that covered a broad range of industries, estimates derived from studies of the mining and manufacturing industry and the service industry tend to be statistically inferior in terms of both the effect size and statistical significance, when other study conditions are held constant. Second, the closer the first year of the estimation period is to the present, the lower the empirical assessment of the effect of ownership concentration on firm performance tends to be. This indicates that, as the transition process progresses, the performance gap between companies with a large shareholder(s) and their counterparts with dispersed ownership is gradually eliminated. Third, the effect size measured by using variables describing the degree of ownership concentration is clearly larger than that measured by using variables describing ownership by leading shareholders or variables describing ownership by block shareholders. Fourth, the effect sizes of the linear term and the squared term of the ownership variable that had been simultaneously estimated in studies that took into account the possible curvilinear effect of ownership concentration on firm performance are significantly smaller and significantly larger, respectively, as compared to the effect sizes reported by studies that do no not take nonlinearity into account.[12] Fifth, the simultaneous estimation of an interaction term(s) reduces the effect size of the single term of the ownership variable. Sixth, the statistical significance of estimates is considerably lower with the ownership variables for which the state is specified as the owner type, as compared to ownership variables for which no owner type is specified.

In addition to the above, data sources, choice of estimators, and the use of control variables also exert a certain impact on the effect size or statistical significance of the collected estimates. On the other hand, when other conditions are held constant, factors such as the proportion of FSU countries in the target, firm performance variable type, data type, equation type, degree of freedom, and study quality do not seem to cause systematic differences in the empirical results presented by previous studies. We emphasize that the same applies for the treatment for selection bias of privatized firms. In fact, the coefficient of the meta-independent variable is estimated to be insignificant in all 14 models. This result may imply that, although the endogeneity between ownership concentration and firm performance is a matter of the utmost concern, the extant

[12] In fact, in the case when a squared term is simultaneously estimated with a single term of an ownership variable, the synthesized effect sizes of the single term and the squared term of the ownership variable by a random-effects model are -0.055 (z=-3.928, p=0.000) and 0.056 (z=3.794, p=0.000), respectively, whereas in the case when a squared term is not simultaneously estimated, the synthesized effect size of the ownership variable is 0.012 (z=8.223, p=0.000).

studies could not address this issue effectively. In sum, the negative correlation between the quality level and the *t* value mentioned in the previous section likely results from differences in the empirical methods and data used across the previous studies.

The meta-regression analysis presented in this section is in agreement with the meta-synthesis results presented in the previous section, in that they both demonstrate that differences in the target industries, estimation periods, and ownership variable types could profoundly affect the reported empirical results, as outlined above. The correlation between the firm performance variable type and the heterogeneity across studies, however, was not supported by the meta-regression analysis. The estimates presented in **Table 4** suggest that the characteristics of ownership variables other than the variable type and ownership type could also be crucial factors influencing the empirical evaluation of the effect of ownership concentration on firm performance. It is quite interesting that there is a statistically robust difference between the effect sizes of the studies that verified the potential nonlinearity between ownership concentration and firm performance and those that did not.

7 Assessment of Publication Selection Bias

As the final step of our meta-analysis, in this section we will examine the likelihood of publication selection bias and the presence of genuine empirical evidence in this research field.

Figure 3 illustrates the funnel plot used to investigate type I publication selection bias. As shown in this figure, even if the true effect is assumed to be zero (denoted by the vertical dotted line in the figure), and even if -0.00102, or the mean of the top 10% most precise estimates (denoted by the solid line in the figure), is regarded as the approximation value of the true effect, the funnel plot demonstrates no apparent asymmetry, although estimates with a 150 or higher value of 1/*SE* tend to appear on the positive side.[13] The ratio of positive to negative estimates, however, is 856:661; therefore, if the true effect is assumed to be zero, the null hypothesis that the number of positive estimates equals the number of negative estimates is easily rejected (z=5.007, p=0.000). In addition, if the mean of the top 10% most precise estimates is regarded as the approximation value of the true effect, the collected estimates are divided into a ratio of 867:650, with a value of -0.00102 being the threshold; accordingly, the null hypothesis is again strongly rejected (z=5.571, p=0.000). Therefore, the results of these statistical tests strongly suggest the possibility of a type I publication selection bias in the research field addressed in this paper.

Next, looking at the Galbraith plot in **Figure 4** to detect type II publication selection bias,

[13] The analytical approach whereby the mean of the most precise 10% of estimates is regarded as the approximate value of the true effect was originally proposed by Stanley (2005).

we can confirm that it is highly unlikely that *t* values that fall within the range of ±1.96 (this range is defined by the two-sided critical values at the 5% significance level) account for 95% of all collected estimates. In fact, *t* values that satisfy this condition account for only 60.7% (921 of 1517) of the collected estimates, which strongly rejects the null hypothesis that *t* values that satisfy this condition account for 95% of all estimates (z=61.275, p=0.000). In addition, even if the mean of the top 10% most precise estimates stands for the true effect, the null hypothesis that the estimates whose statistics $|(k\text{th estimation result} - \text{true effect})/SE_k|$ exceed the threshold of 1.96 account for 5% of all estimates is also rejected (z=59.862, p=0.000). These findings demonstrate that the likelihood of type II publication bias is extremely high.

Finally, in accordance with the methods and procedures described in Section 3, we examine the two types of publication selection bias and the presence of genuine empirical evidence by estimating meta-regression models developed especially for this purpose. **Table 5** summarizes the results. According to Panel (a) of this table, the null hypothesis—that the intercept term (β_0) in Eq. (4) is equal to zero—is rejected in two of three models. Furthermore, Panel (b) shows that the intercept term (β_0) in Eq. (5) shows a coefficient that is statistically significantly different from zero in all three models. Thus, in line with the aforementioned test results, the presence of both type I and type II publication biases is strongly suspected in this research field.

On the other hand, even though publication selection bias may be present in the selected studies, it is still possible to assume that their empirical results might constitute genuine evidence of the effect of ownership concentration on firm performance. However, as shown in Panel (a) of **Table 5**, the null hypothesis—that the coefficient (β_1) of the inverse of the standard error in Eq. (4) is zero—is not rejected in all models. Furthermore, as shown in Panel (c) of the same table, the coefficient (β_1) of the inverse of the standard error in Eq. (6) is also estimated to be insignificant in two of three models. In sum, based on PET and PEESE results, we can conclude that research findings from the 69 studies listed in **Table 1** do not provide any empirical evidence that suggests the presence of a non-zero effect of ownership concentration on firm performance. Accordingly, we should note that some caution is needed in interpreting the results obtained from the meta-synthesis reported in **Table 2**, which suggest the presence of the statistically significant and positive impact of concentrated ownership on the performance of firms in CEE and FSU countries.

8 Conclusions

The question of whether concentrating ownership in the hands of specific individuals and/or corporations can play an active role in improving the management discipline and performance of their owned companies is of great interest, in both political and academic senses, to CEE/FSU

countries that are currently transitioning to the market economy and whose stock markets and financial systems are, therefore, still immature. To verify the conclusions reached on this topic by the body of empirical evidence available in the existing literature, we have carried out a meta-analysis of 1517 estimates collected from 69 published studies that empirically examined the relationship between the increased concentration of corporate ownership and the performance of firms operating in CEE/FSU countries.

The meta-synthesis of all collected estimates indicated the presence of a statistically significant and positive effect of ownership concentration on firm performance. Nevertheless, because the empirical results presented by the previous studies are too mixed to provide any strong conclusions, the synthesized effect size is only modest at best. The meta-regression analysis conducted to identify factors underlying the small effect size revealed that differences in the target industries, the estimation periods, the design of the ownership variables, the data sources, and the estimators, as well as the choice of control variables, could have had systematic and profound effects on the empirical results presented by these studies. The test carried out to examine publication selection bias revealed the high likelihood of both type I and type II publication selection biases in this research field, and due to the magnitude of these biases, it is confirmed that the collected estimates do not contain genuine evidence regarding the effect of ownership concentration on firm performance in CEE and FSU countries.

Strengthening the empirical evidence base in this research field is essential to identifying the true effect of ownership concentration on firm performance and to settling disputes over this issue once and for all. The results of the meta-analysis presented in this paper strongly suggest how important it is to measure the degree of ownership concentration with greater precision and to take into account the possible nonlinearity in the relationship between the degree of ownership concentration and firm performance. Further research efforts along this line are encouraged.

APPENDIX
METHOD FOR EVALUATING THE QUALITY LEVEL OF A STUDY

This appendix describes the evaluation method used to determine the quality level of the studies subjected to our meta-analysis.

For journal articles, we used the ranking of economics journals that had been published as of November 1, 2012, by IDEAS—the largest bibliographic database dedicated to economics and available freely on the Internet (http://ideas.repec.org/)—as the most basic information source for our evaluation of quality level. IDEAS provides the world's most comprehensive ranking of

economics journals, and as of November 2012, 1173 academic journals were ranked.

We divided these 1173 journals into 10 clusters, using a cluster analysis based on overall evaluation scores. We then assigned each of these journal clusters a score (weight) from 1 (the lowest journal cluster) to 10 (the highest).

For academic journals that are not ranked by IDEAS, we referred to the Thomson Reuters Impact Factor and other journal rankings and identified the same level of IDEAS ranking–listed journals that correspond to these non-listed journals. We have assigned each of them the same score as its counterpart.

For academic books and book chapters, we have assigned a score of 1 in principle; however, if at least one of the following conditions was met, each of the relevant books or chapters uniformly received a score of 4, which is the median value of the scores assigned to the above-mentioned IDEAS ranking–listed economics journals: (1) the academic book or book chapter clearly states that it has gone through a peer review process; (2) its publisher is a leading academic publisher that has external evaluations carried out by experts; or (3) the research level of the study has been evaluated by the authors to be obviously high.

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Table 1. List of selected studies on the impact of ownership concentration on firm performance and restructuring in transition economies for meta-analysis

Author(s) (publication year)	Target country [a]	Target industry	Estimation period [b]	Firm performance variable type (dependent variable) [c]	Ownership variable type (independent variable) [d]	Number of collected estimates
Claessens (1997)	CZ, SK	Various industries	1993	D	I, III	8
Earle and Estrin (1997)	RU	Manufacturing	1994	B, E	I, II	48
Claessens and Djankov (1999)	CZ	Various industries	1993-1997	B, C	I	10
Jones and Mygind (2000)	EE	Various industries	1994-1997	A, B, F	I, II	39
Makhija and Spiro (2000)	CZ	Various industries	1993	D	I	24
Bevan et al. (2001)	RU	Manufacturing	2000	B, C, E	I	10
Dean and Andreyeva (2001)	UA	Various industries	1995-1998	B	III	1
UNECE (2001)	EE, SI	Manufacturing	1994-1998	B	I	4
Filatotchev et al. (2001)	RU	Manufacturing	1999	C, E	I	6
Harper (2001)	CZ	Various industries	1993-1994	A-C	I	5
Jones and Mygind (2001)	EE	Various industries	1993-1997	A	I	12
Kuznetsov and Muravyev (2001a)	RU	Various industries	1995-1997	B-D	I, III	15
Kuznetsov and Muravyev (2001b)	RU	Various industries	1995-1997	B-D	I	26
Earle and Telegdy (2002)	RO	Mining and manufacturing	1992-1999	B	II	7
Grosfeld and Tressel (2002)	PL	Various industries	1994-1998	A	I	14
Harper (2002)	CZ	Various industries	1989-1994	A-C	I	5
Kőrösi (2002)	HU	Various industries	1993-1999	A	I	14
Muravyev (2002)	RU	Mining and manufacturing	1993-2000	B, C	II	2
Perotti and Gelfer (2002)	RU	Various industries	1995-1996	E	II	1
Weiss and Nikitin (2002)	CZ	Various industries	1994-1996	B, C	I	30
Andreyeva (2003)	UA	Mining and manufacturing	1996-2000	A	I, II, III	48
Damijan et al. (2003a)	CEE 8 countries	Manufacturing	1995-1998	A	I	8
Damijan et al. (2003b)	CEE 10	Manufacturing	1994-1999	A	I	10
Earle and Telegdy (2003)	RO	Various industries	1992-2001	B	I	10
Guriev et al. (2003)	RU	Mining and manufacturing	2001	E	I	6
Kočenda and Valachy (2003)	CZ	Various industries	1996-1999	A-C	I	12
Pivovarsky (2003)	UA	Various industries	1998	B, C	III	42
Guriev et al. (2004)	RU	Mining and manufacturing	2001	E	I	6
Rizov (2004)	BG	Manufacturing	1998-1999	C	I	2
Rojec et al. (2004)	EE, SI	Manufacturing	1994-1998	F	I	4
Atanasov (2005)	BG	Various industries	1998-1999	D	I	16
Earle et al. (2005)	HU	Various industries	1996-2001	C	II, III	18
Kuznetsov et al. (2006)	RU	Mining and manufacturing	1999-2003	C, E	I, II	36
Miller (2006)	BG	Various industries	1996-2003	B, C	I, II	12
Bhaumik and Estrin (2007)	RU	Manufacturing	1997-1999	A	I, II	5
Estrin et al. (2007)	BY	Manufacturing	2004	B, C, F	I	14
Grygorenko and Lutz (2007)	UA	Mining and manufacturing	1997-1999	A-C	I	6

Author(s) (publication year)	Target country [a]	Target industry	Estimation period [b]	Firm performance variable type (dependent variable) [c]	Ownership variable type (independent variable) [d]	Number of collected estimates
Hanousek et al. (2007)	CZ	Various industries	1996-1999	A, C	I, II	60
Mueller and Peev (2007)	CEE 11 countries	Various industries	1999-2003	D	I, II	7
Prašnikar and Svejnar (2007)	SI	Various industries	1991-1995	E	I	6
Altomonte and Colantone (2008)	RO	Various industries	1996-2001	B	I	2
Asaftei et al. (2008)	RO	Manufacturing	1995-2003	A	I	6
Filatotchev et al. (2008)	EE, HU, PL, SI, SK	Manufacturing	2002-2003	F	I	3
Kuznetsov et al. (2008)	RU	Mining and manufacturing	1999-2003	C, E	I	48
Grosfeld (2009)	PL	Various industries	2002-2003	D	I, II	75
Maury and Liljeblom (2009)	RU	Various industries	1998-2003	D	I	37
Atanasov et al. (2010)	BG	Various industries	1999-2003	D	I, II	4
Koman et al. (2011)	ME	Various industries	2004-2007	B	I	18
Džanić (2012)	HR	Various industries; manufacturing; services	2003-2009	B-D	I, II	69
Hanousek et al. (2012)	CZ	Various industries	1998-2007	A	I, II	190
Iwasaki et al. (2012)	HU	Various industries	1999-2003	A	I	7
Jurajda and Stančík (2012)	CZ	Various industries	1995-2005	B, C	I	2
Kočenda and Hanousek (2012)	CZ	Various industries	1998-2005	C	I, II	144
Sabirianova et al. (2012)	CZ, RU	Mining and manufacturing	1992-2000	A	I	40
Stephan et al. (2012)	UA	Various industries	2002-2006	C	I	2
Baghdasaryan and la Cour (2013)	CZ	Various industries	1996-2004	A, B	I	5
Bogetić and Olusi (2013)	RU	Manufacturing	2003-2008	B	I	4
Mihai (2013)	RO	Various industries	2010	C	I, III	6
Mykhayliv and Zauner (2013)	UA	Various industries	2003-2007	E	I	18
Gugler et al. (2014)	CEE and FSU 11 countries	Various industries	2000-2007	C, D	I	27
Muravyev et al. (2014) [e]	RU	Various industries	1998-2009	C, D	I, II	28
Vintilă et al. (2014)	RO	Various industries	2007-2011	D	I, II, III	20
Kalezić (2015)	ME	Various industries	2004-2008	C	I, III	6
Ankudinov and Lebedev (2016)	RU	Various industries	2003-2011	F	I	50
Gupta et al. (2016)	RU	Various industries	2011	D	III	1
Konečný and Částek (2016)	CZ	Various industries	2010-2012	B	III	18
Vanteeva and Hickson (2016)	RU	Various industries	1998-2006	D	I	28
D'Souza et al. (2017)	CEE and FSU 27 countries	Various industries	2002-2009	A, B	I	6
Muravyev (2017)	RU	Various industries	1998-2014	B, D	I, II	44

[a] Country abbreviations: BG—Bulgaria; BY—Belarus; CZ—Czech Republic; EE—Estonia; HR—Croatia; HU—Hungary; ME—Montenegro; PL—Poland; RO—Romania; RU—Russia; SI—Slovenia; SK—Slovakia; UA—Ukraine

[b] Estimation period may differ depending on target countries.

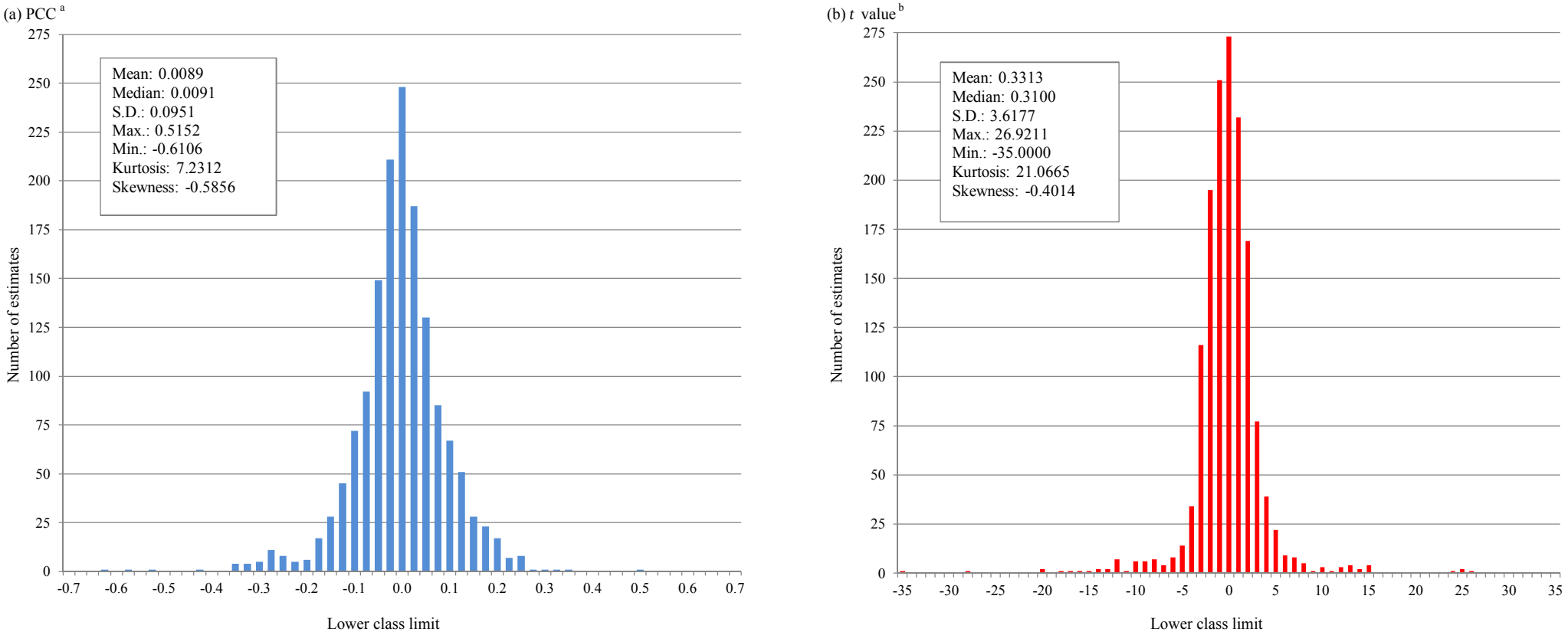
[c] A: Sales and output; B: Efficiency; C: Productivity; D: Firm value; E: Restructuring; F: Other firm performance

[d] I: Variables of top shareholdings; II: Variables of block shareholding; III: Degree of ownership concentration

[e] Including estimates not reported in the paper. We thank Alexander Muravyev for providing us with full estimation results.

Source: Compiled by the authors

Figure 1. Distribution of partial correlation coefficients and *t* values of collected estimates (*K*=1517)



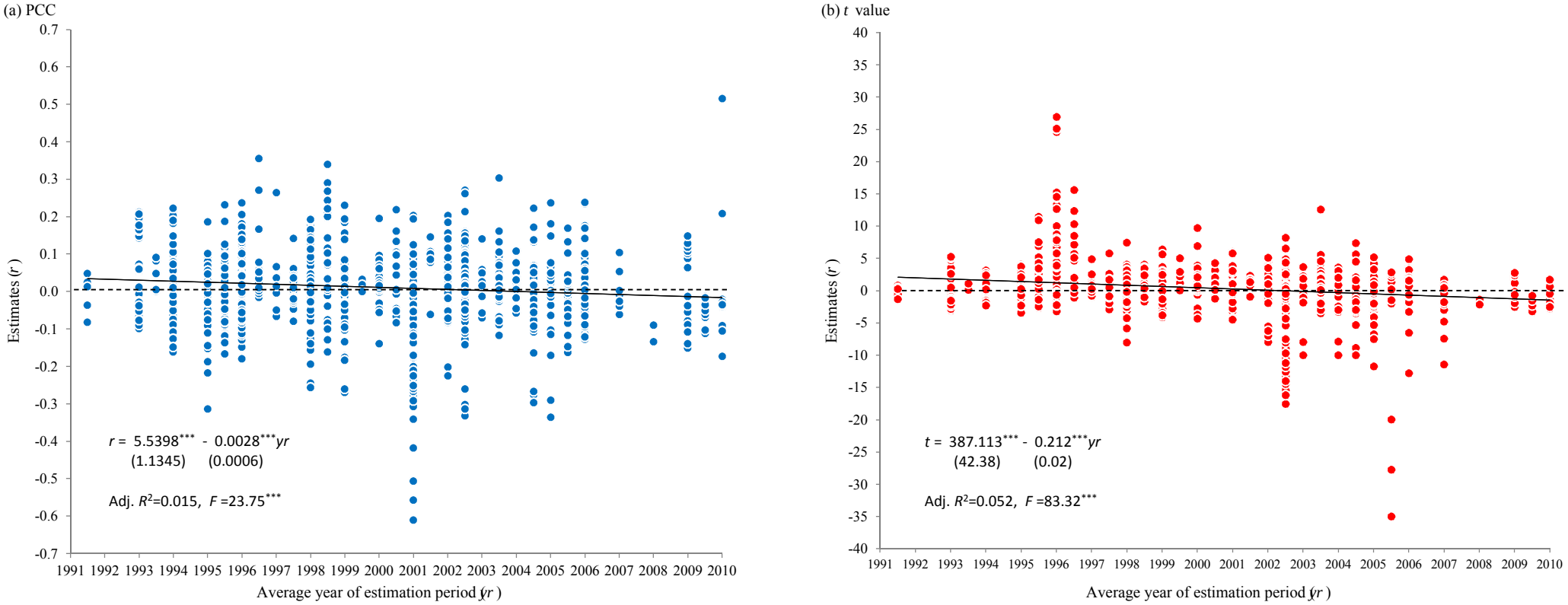
Notes:

[a] Shapiro-Wilk normality test:W=0.949, z=9.697, p=0.000

[b] Shapiro-Wilk normality test:W=0.798, z=13.154, p=0.000

Source: Authors' illustration

Figure 2. Chronological order of partial correlation coefficients and *t* values of collected estimates (*K*=1517)



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

Source: Authors' illustration

Table 2. Synthesis of estimates

	Number of estimates (K)	(a) Synthesis of PCCs			(b) Combination of t values			
		Fixed-effect model (z value) [a]	Random-effects model (z value) [a]	Test of homogeneity [b]	Unweighted combination (p value)	Weighted combination (p value)	Median of t values	Fail-safe N (fsN)
All studies	1517	0.003 *** (9.30)	0.011 *** (7.50)	20000.000 ***	12.905 *** (0.00)	2.196 *** (0.01)	0.310	91848
Comparison in terms of target country								
Studies of CEE countries	919	-0.001 ** (-2.43)	0.009 *** (5.48)	11000.000 ***	7.391 *** (0.00)	1.260 (0.11)	0.200	17633
Studies of FSU countries	555	0.009 *** (17.03)	0.011 *** (4.01)	8032.501 ***	9.206 *** (0.00)	1.618 ** (0.05)	0.400	16829
Studies of CEE and FSU countries	43	0.030 *** (9.77)	0.037 *** (3.86)	335.775 ***	9.408 *** (0.00)	1.165 (0.12)	1.930	1364
Comparison in terms of target industries								
Studies that cover various industries	1104	0.003 *** (6.16)	0.012 *** (7.74)	7007.207 ***	11.938 *** (0.00)	2.001 ** (0.02)	0.386	57042
Studies of the mining and manufacturing industry	363	0.010 *** (20.51)	0.010 *** (3.13)	11000.000 ***	12.687 *** (0.00)	2.344 *** (0.01)	0.347	21229
Studies of the service industry	50	-0.011 *** (-16.39)	-0.017 *** (-4.50)	1632.148 ***	-19.198 *** (0.00)	-2.743 *** (0.00)	-1.882	6760
Comparison in terms of estimation period								
Studies in which the average year of the estimation period is before 2000	643	0.026 *** (57.05)	0.020 *** (10.95)	5696.591 ***	29.997 *** (0.00)	5.144 *** (0.00)	0.570	213171
Studies in which the average year of the estimation period is in or after 2000	874	-0.015 *** (-37.83)	0.003 * (1.79)	9625.079 ***	-8.727 *** (0.00)	-1.477 * (0.07)	0.102	23726
Comparison in terms of firm performance variable type								
Studies that adopt sales and output	401	0.005 *** (13.50)	0.008 *** (3.86)	11000.000 ***	9.446 *** (0.00)	1.424 * (0.08)	0.667	12821
Studies that adopt efficiency	187	-0.009 *** (-11.62)	0.028 *** (5.56)	4435.242 ***	9.812 *** (0.00)	1.917 ** (0.03)	0.786	6466
Studies that adopt productivity	411	0.002 (1.54)	-0.001 (-0.17)	1867.163 ***	-0.583 (0.28)	-0.108 (0.46)	0.040	-359
Studies that adopt firm value	317	0.036 *** (17.40)	0.032 *** (6.92)	1339.794 ***	14.573 *** (0.00)	2.263 *** (0.01)	1.000	24561
Studies that adopt the restructuring	128	-0.012 ** (-2.17)	-0.014 (-1.32)	440.973 ***	-2.335 *** (0.01)	-0.494 (0.31)	-0.069	130
Studies that adopt other indices of firm performance	73	-0.023 *** (-6.35)	-0.018 ** (2.27)	289.196 ***	-4.904 *** (0.00)	-0.984 (0.16)	-1.150	576
Comparison in terms of ownership variable type								
Studies that use variables of top shareholding	1034	0.007 *** (18.87)	0.013 *** (7.45)	16000.000 ***	16.040 *** (0.00)	2.671 *** (0.00)	0.383	97276
Studies that use variables of block shareholding	380	-0.010 *** (-15.67)	-0.002 (-0.69)	3274.586 ***	-5.141 *** (0.00)	-0.944 (0.17)	0.015	3331
Studies that use degree of ownership concentration	103	0.005 ** (2.19)	0.037 *** (5.86)	497.400 ***	8.580 *** (0.00)	1.409 * (0.08)	1.667	2699

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.

Source: Authors' estimations

Table 3. Name, definition, and descriptive statistics of meta-independent variables

Variable name	Definition	Descriptive statistics		
		Mean	Median	S.D.
Proportion of FSU countries	Proportion of FSU countries in target countries	0.374	0.000	0.479
Mining and manufacturing industries	1 = if target industry is the mining and manufacturing industries, 0 = otherwise	0.239	0	0.427
Service industry	1 = if target industry is the service industry, 0 = otherwise	0.033	0	0.179
First year of estimation	First year of estimation period	1998.889	1998	4.261
Length of estimation	Years of estimation period	4.686	4	3.633
Efficiency	1 = if efficiency is adopted as the benchmark index of the firm performance variable, 0 = otherwise	0.123	0	0.329
Productivity	1 = if productivity is adopted as the benchmark index of the firm performance variable, 0 = otherwise	0.271	0	0.445
Firm value	1 = if firm value is adopted as the benchmark index of the firm performance variable, 0 = otherwise	0.209	0	0.407
Restructuring	1 = if restructuring activity is adopted as the benchmark index of the firm performance variable, 0 = otherwise	0.084	0	0.278
Other firm performance	1 = if a performance measure other than sale/output and the above indices is adopted as the benchmark index of the firm performance variable, 0 = otherwise	0.048	0	0.214
Block shareholding	1 = if ownership variable of block shareholding is used for estimation, 0 = otherwise	0.250	0	0.433
Degree of ownership concentration	1 = if degree of ownership concentration is used for estimation, 0 = otherwise	0.068	0	0.252
With a squared term	1 = if estimation is carried out with a squared term of the ownership variable, 0 = otherwise	0.012	0	0.108
Squared term	1 = if ownership variable is a squared term, 0 = otherwise	0.012	0	0.108
Dummy variable	1 = if ownership variable is a dummy variable, 0 = otherwise	0.670	1	0.470
Lagged variable	1 = if a lagged ownership variable is used for estimation, 0 = otherwise	0.110	0	0.313
With an interaction term(s)	1 = if estimation is carried out with an interaction term(s) of the ownership variable, 0 = otherwise	0.101	0	0.301
State	1 = if ownership variable used for estimation belongs to the category of state, 0 = otherwise	0.162	0	0.368
Domestic outsider investors	1 = if ownership variable used for estimation belongs to the category of domestic outsider investors, 0 = otherwise	0.192	0	0.394
Foreign investors	1 = if ownership variable used for estimation belongs to the category of foreign investors, 0 = otherwise	0.171	0	0.377
Insiders	1 = if ownership variable used for estimation belongs to the category of insiders, 0 = otherwise	0.074	0	0.262
Cross-sectional data	1 = if cross-sectional data is employed for empirical analysis, 0 = otherwise	0.441	0	0.497
Commercial database	1 = if data employed for empirical analysis is based on a commercial database, 0 = otherwise	0.558	1	0.497
Original enterprise survey	1 = if data employed for empirical analysis is based on an original enterprise survey, 0 = otherwise	0.142	0	0.350
FE	1 = if fixed-effects panel estimator is used for estimation, 0 = otherwise	0.207	0	0.405
RE	1 = if random-effects panel estimator is used for estimation, 0 = otherwise	0.081	0	0.273
Robust	1 = if robust estimator is used for estimation, 0 = otherwise	0.010	0	0.099
GMM	1 = if GMM estimator is used for estimation, 0 = otherwise	0.038	0	0.190
Other estimators	1 = if an estimator other than OLS and the above estimators is used for estimation, 0 = otherwise	0.063	0	0.242
IV/2SLS/3SLS	1 = if instrumental variable method or 2SLS or 3SLS is used for estimation, 0 = otherwise	0.183	0	0.387
Difference model	1 = if difference model is used for estimation, 0 = otherwise	0.076	0	0.266
Translog model	1 = if translog model is used for estimation, 0 = otherwise	0.264	0	0.441
Treatment for selection bias	1 = if estimation treats for the selection bias of privatized companies, 0 = otherwise	0.122	0	0.327
Market competition	1 = if estimation simultaneously controls for the degree of market competition, 0 = otherwise	0.044	0	0.206
Location fixed effects	1 = if estimation simultaneously controls for location fixed effects, 0 = otherwise	0.157	0	0.364
Industry fixed effects	1 = if estimation simultaneously controls for industry fixed effects, 0 = otherwise	0.599	1	0.490
Time fixed effects	1 = if estimation simultaneously controls for time fixed effects, 0 = otherwise	0.485	0	0.500
√‾Degree of freedom	Root of degree of freedom of the estimated model	52.046	29.883	66.498
Quality level	Ten-point scale of the study's quality level[a]	5.295	5	2.551

Notes:

[a] See the Appendix for more details.

Source: Authors' calculations

Table 4. Meta-regression analysis

(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	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Meta-independent variable (Default)/Model	[1]	[2]	[3]	[4]	[5]	[6] [a]	[7] [b]
Composition of target countries (Proportion of CEE countries)							
Proportion of FSU countries	0.0030	-0.0020	-0.0349 ***	-0.0141	-0.0200	-0.0199	-0.0615 **
	(0.012)	(0.013)	(0.011)	(0.010)	(0.016)	(0.016)	(0.025)
Target industry (Various industries)							
Mining and manufacturing industry	-0.0389 **	-0.0407 **	-0.0092	-0.0118	-0.0484 **	-0.0484 **	-0.0718 *
	(0.019)	(0.019)	(0.009)	(0.010)	(0.020)	(0.020)	(0.043)
Service industry	-0.0526 *	-0.0541 *	-0.0048	-0.0061	-0.0435 **	-0.0435 **	-0.0747 *
	(0.027)	(0.027)	(0.010)	(0.012)	(0.019)	(0.019)	(0.040)
Estimation period							
First year of estimation	-0.0042 ***	-0.0047 ***	-0.0037 ***	-0.0032 ***	-0.0018	-0.0018	-0.0031
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Length of estimation	0.0001	0.0002	-0.0003	-0.0006	0.0037	0.0037	0.0007
	(0.002)	(0.003)	(0.001)	(0.001)	(0.003)	(0.003)	(0.007)
Firm performance variable type (Sales/output)							
Efficiency	0.0024	0.0163	-0.0037	0.0059	0.0053	0.0053	0.0102
	(0.016)	(0.023)	(0.010)	(0.010)	(0.022)	(0.022)	(0.026)
Productivity	-0.0265	-0.0283	-0.0035	-0.0113	-0.0289	-0.0289	-0.0227
	(0.018)	(0.019)	(0.008)	(0.011)	(0.020)	(0.020)	(0.023)
Firm value	-0.0045	0.0182	0.0252 **	0.0146	-0.0209	-0.0209	-0.0215
	(0.018)	(0.017)	(0.011)	(0.013)	(0.022)	(0.022)	(0.029)
Restructuring	-0.0286	-0.0372 *	-0.0159	-0.0270	0.0272	0.0271	0.0501 *
	(0.024)	(0.020)	(0.023)	(0.021)	(0.026)	(0.026)	(0.029)
Other firm performance	-0.0037	0.0233	0.0522 **	0.0264	-0.0253	-0.0252	-0.0467
	(0.034)	(0.035)	(0.022)	(0.028)	(0.042)	(0.042)	(0.036)
Ownership variable type (Top shareholding)							
Block shareholding	0.0034	0.0045	-0.0058 ***	-0.0066 *	-0.0017	-0.0017	-0.0034
	(0.011)	(0.010)	(0.001)	(0.004)	(0.011)	(0.011)	(0.011)
Degree of ownership concentration	0.0538 ***	0.0553 **	0.0280 **	0.0342 ***	0.0487 **	0.0487 **	0.0368 *
	(0.018)	(0.021)	(0.012)	(0.010)	(0.019)	(0.019)	(0.020)
Other characteristics of ownership variable							
With a squared term	-0.0659 ***	-0.0892 ***	-0.0751 ***	-0.0718 ***	-0.0540 ***	-0.0540 ***	-0.0557 ***
	(0.023)	(0.027)	(0.022)	(0.021)	(0.017)	(0.017)	(0.016)
Squared term	0.0480 ***	0.0402 **	0.0321 **	0.0391 ***	0.0616 ***	0.0616 ***	0.0604 ***
	(0.016)	(0.017)	(0.015)	(0.013)	(0.013)	(0.013)	(0.016)
Dummy variable (Ownership share)	0.0067	0.0172	-0.0153	-0.0065	0.0485 **	0.0485 **	0.0689 **
	(0.017)	(0.019)	(0.012)	(0.011)	(0.024)	(0.024)	(0.033)
Lagged variable	-0.0165	-0.0106	-0.0204 **	-0.0176 **	-0.0041	-0.0042	0.0026
	(0.011)	(0.012)	(0.009)	(0.008)	(0.013)	(0.013)	(0.018)
With an interaction term(s)	-0.0398 **	-0.0419 **	-0.0315 ***	-0.0314 ***	-0.0312 **	-0.0312 **	-0.0267
	(0.018)	(0.016)	(0.003)	(0.008)	(0.014)	(0.014)	(0.017)
Ownership type (Not specified)							
State	-0.0134	-0.0321	-0.0193 *	-0.0237	-0.0078	-0.0078	-0.0038
	(0.023)	(0.021)	(0.012)	(0.014)	(0.026)	(0.026)	(0.028)
Domestic outsider investors	0.0308	0.0144	0.0134	0.0186	0.0340	0.0340	0.0351
	(0.020)	(0.018)	(0.009)	(0.013)	(0.023)	(0.023)	(0.025)
Foreign investors	0.0247	0.0061	-0.0038	0.0017	0.0131	0.0131	0.0106
	(0.020)	(0.013)	(0.003)	(0.007)	(0.015)	(0.015)	(0.015)
Insiders	0.0113	0.0032	0.0015	0.0069	0.0242	0.0242	0.0257
	(0.022)	(0.020)	(0.011)	(0.015)	(0.017)	(0.017)	(0.018)
Data type (Panel data)							
Cross-sectional data	-0.0081	-0.0091	0.0195	0.0116	0.0089	0.0089	-0.0337
	(0.018)	(0.020)	(0.014)	(0.015)	(0.017)	(0.017)	(0.027)
Data source (Official statistics)							
Commercial database	0.0002	-0.0155	-0.0143 **	-0.0127	0.0030	0.0031	-0.0155 ***
	(0.014)	(0.014)	(0.007)	(0.008)	(0.017)	(0.017)	(0.002)
Original enterprise survey	0.0262	0.0122	-0.0030	0.0114	0.0322	0.0322	dropped
	(0.018)	(0.017)	(0.016)	(0.015)	(0.024)	(0.024)	
Estimator (OLS)							
FE	0.0103	0.0049	-0.0074	0.0064	-0.0058	-0.0057	-0.0075
	(0.015)	(0.014)	(0.013)	(0.009)	(0.014)	(0.014)	(0.015)
RE	0.0058	0.0080	0.0124 *	0.0133 *	0.0070	0.0070	0.0031
	(0.011)	(0.012)	(0.007)	(0.008)	(0.011)	(0.011)	(0.011)
Robust	-0.0484	-0.0694	-0.0903 ***	-0.0697 **	0.0190 ***	0.0190 ***	0.0272 ***
	(0.045)	(0.055)	(0.023)	(0.033)	(0.004)	(0.004)	(0.000)
GMM	0.0427 **	0.0283	0.0111	0.0272	-0.0066	-0.0065	-0.0169
	(0.020)	(0.019)	(0.023)	(0.020)	(0.016)	(0.017)	(0.019)
Other estimators	0.0297 *	0.0199	-0.0064	0.0065	-0.0010	-0.0009	-0.0113
	(0.018)	(0.017)	(0.010)	(0.009)	(0.011)	(0.011)	(0.010)
IV/2SLS/3SLS	0.0130	0.0049	0.0106 ***	0.0151 **	0.0156	0.0156	0.0203
	(0.017)	(0.010)	(0.004)	(0.006)	(0.026)	(0.027)	(0.029)
Equation type (Models other than those listed below)							
Difference model	-0.0094	0.0121	-0.0214	-0.0179	-0.0131	-0.0130	dropped
	(0.029)	(0.032)	(0.016)	(0.020)	(0.034)	(0.034)	
Translog model	-0.0182	-0.0196	-0.0149	-0.0140	0.0088	0.0088	0.0283 *
	(0.014)	(0.014)	(0.010)	(0.009)	(0.014)	(0.014)	(0.016)
Treatment for selection bias of privatized firms							
Treatment for selection bias	-0.0170	-0.0198	0.0085	-0.0028	-0.0305	-0.0304	-0.0307
	(0.017)	(0.017)	(0.012)	(0.012)	(0.022)	(0.023)	(0.029)
Control variable							
Market competition	0.0517 **	0.0572 ***	0.0184	0.0182	0.0567 **	0.0567 **	0.0249 ***
	(0.023)	(0.021)	(0.016)	(0.016)	(0.026)	(0.027)	(0.004)
Location fixed effects	-0.0250	-0.0404 **	-0.0177	-0.0158	-0.0281 *	-0.0280 *	-0.0440 **
	(0.018)	(0.016)	(0.012)	(0.012)	(0.016)	(0.016)	(0.017)
Industry fixed effects	-0.0024	-0.0001	-0.0060	-0.0044	0.0134	0.0133	0.0261
	(0.013)	(0.013)	(0.007)	(0.008)	(0.013)	(0.014)	(0.018)
Time fixed effects	-0.0235	-0.0107	0.0316 *	0.0129	-0.0194	-0.0193	-0.0542 ***
	(0.016)	(0.018)	(0.016)	(0.012)	(0.015)	(0.015)	(0.015)
Degree of freedom and research quality							
√ Degree of freedom	-0.000042	0.000026	0.000032	-0.000022	-0.000041	-0.000041	0.000087
	(0.00005)	(0.00007)	(0.00004)	(0.00004)	(0.00006)	(0.00006)	(0.00010)
Quality level	0.0033	-	0.0029 **	0.0038 **	0.0036	0.0036	dropped
	(0.002)	(-)	(0.001)	(0.002)	(0.003)	(0.003)	
Intercept	8.3884 ***	9.4916 ***	7.4661 ***	6.3252 ***	3.6653	3.6676	6.1999
	(2.935)	(3.259)	(1.321)	(1.775)	(2.678)	(2.710)	(6.038)
K	1517	1517	1517	1517	1517	1517	1517
R^2	0.147	0.190	0.501	0.236	-	0.047	0.015

(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	Cluster-robust random-effects panel GLS	Cluster-robust fixed-effects panel LSDV
Meta-independent variable (Default)/Model	[8]	[9]	[10]	[11]	[12]	[13] [c]	[14] [d]
Composition of target countries (Proportion of CEE countries)							
Proportion of FSU countries	-0.3394	-0.2182	0.5863	0.1849	0.5390	0.5255	1.8062 **
	(0.466)	(0.490)	(1.209)	(1.032)	(0.681)	(0.692)	(0.816)
Target industry (Various industries)							
Mining and manufacturing industry	0.3720	0.7063	-3.2013 **	-0.7451	-2.5592 **	-2.5405 **	-4.1445 **
	(0.859)	(0.788)	(1.410)	(1.157)	(1.108)	(1.125)	(1.983)
Service industry	-2.0625	-1.9779	-5.3010 **	-2.5738	-2.6648 ***	-2.6519 ***	-3.8789 *
	(1.605)	(1.449)	(2.202)	(1.985)	(0.891)	(0.900)	(2.011)
Estimation period							
First year of estimation	-0.1168 **	-0.1492 **	-0.5549 ***	-0.2414 **	-0.1925 *	-0.1918 *	-0.2004
	(0.045)	(0.064)	(0.133)	(0.116)	(0.106)	(0.107)	(0.162)
Length of estimation	0.0432	0.0034	0.0821	0.0639	0.0258	0.0276	-0.0242
	(0.072)	(0.071)	(0.226)	(0.133)	(0.114)	(0.114)	(0.300)
Firm performance variable type (Sales/output)							
Efficiency	-0.8895	0.1194	-3.9031 *	-2.6225	-0.0914	-0.0954	0.1044
	(1.080)	(0.835)	(2.060)	(1.646)	(0.547)	(0.556)	(0.555)
Productivity	-1.3084	-0.8216	-2.3562	-2.1037 *	-0.4304	-0.4347	-0.2288
	(0.864)	(0.606)	(1.422)	(1.154)	(0.462)	(0.469)	(0.446)
Firm value	-0.2921	0.6975	-1.9632	-0.8995	-0.5518	-0.5553	-0.3533
	(0.800)	(0.632)	(1.814)	(1.127)	(0.633)	(0.640)	(0.746)
Restructuring	-1.9501 *	-1.6312 **	-2.6357	-3.0647 *	-0.1960	-0.2017	0.0707
	(0.999)	(0.754)	(3.279)	(1.598)	(0.599)	(0.608)	(0.583)
Other firm performance	0.8281	1.5883	12.2074 ***	5.9293 **	-0.4831	-0.4685	-1.0594
	(1.312)	(1.396)	(3.354)	(2.719)	(1.100)	(1.124)	(0.774)
Ownership variable type (Top shareholding)							
Block shareholding	-0.3473	-0.5045 *	-0.7442	-0.3939	-0.4237	-0.4235	-0.4230
	(0.342)	(0.281)	(0.455)	(0.461)	(0.277)	(0.280)	(0.287)
Degree of ownership concentration	0.7749	-0.1064	6.6853 **	3.3152 *	0.5543 *	0.5562	0.5030
	(0.575)	(0.635)	(2.910)	(1.787)	(0.338)	(0.342)	(0.374)
Other characteristics of ownership variable							
With a squared term	-1.1245	-1.4375	-5.6921	-2.6441	-1.6822 ***	-1.6792 ***	-1.7614 ***
	(0.878)	(1.510)	(4.274)	(2.165)	(0.557)	(0.563)	(0.609)
Squared term	1.3025 *	1.1033	-3.0599	-0.0827	0.8257 **	0.8285 *	0.7526
	(0.671)	(1.128)	(4.108)	(1.985)	(0.422)	(0.426)	(0.497)
Dummy variable (Ownership share)	-0.2827	0.3688	-0.0570	0.1813	0.7374	0.7364	0.7603
	(0.543)	(0.675)	(2.109)	(1.233)	(0.482)	(0.487)	(0.543)
Lagged variable	-0.4279	-0.2698	-0.5545	-0.4379	-0.2076	-0.2102	-0.1238
	(0.393)	(0.370)	(1.263)	(0.822)	(0.233)	(0.235)	(0.294)
With an interaction term(s)	-1.3093	-2.1382	-9.3796 ***	-5.1813 *	-2.0209	-2.0184	-2.1826
	(0.899)	(1.374)	(0.918)	(2.679)	(1.394)	(1.409)	(1.587)
Ownership type (Not specified)							
State	-0.9206	-1.4435 **	-2.7557	-2.4115 **	-1.2647 **	-1.2652 **	-1.2472 **
	(0.608)	(0.592)	(2.144)	(1.152)	(0.534)	(0.541)	(0.550)
Domestic outsider investors	0.9066 *	0.0917	2.3910	1.5499	0.1305	0.1326	0.0504
	(0.527)	(0.530)	(1.716)	(1.000)	(0.471)	(0.477)	(0.486)
Foreign investors	0.5219	-0.1798	-0.6006	-0.0462	-0.5428	-0.5385	-0.7173 **
	(0.672)	(0.426)	(0.608)	(0.910)	(0.336)	(0.342)	(0.299)
Insiders	0.0587	-0.4468	0.4194	0.2163	-0.2322	-0.2314	-0.2664
	(0.551)	(0.598)	(1.833)	(1.032)	(0.404)	(0.410)	(0.400)
Data type (Panel data)							
Cross-sectional data	0.8042	1.1567	-0.0135	0.2919	-0.0611	-0.0373	-1.7085
	(0.892)	(1.051)	(2.785)	(1.967)	(0.733)	(0.738)	(1.376)
Data source (Official statistics)							
Commercial database	-1.6093 ***	-1.7269 ***	-5.4020 ***	-4.1461 ***	-1.5166	-1.5320	-0.7848 ***
	(0.583)	(0.486)	(1.163)	(1.201)	(1.050)	(1.065)	(0.269)
Original enterprise survey	-0.2437	-0.7208	-3.0432	-0.7903	1.1406	1.1237	dropped
	(0.717)	(0.759)	(3.225)	(1.833)	(1.104)	(1.114)	
Estimator (OLS)							
FE	0.9190 *	0.7062	-4.8598	-0.1328	-0.2989	-0.2936	-0.5025
	(0.534)	(0.522)	(4.992)	(1.679)	(0.607)	(0.612)	(0.764)
RE	2.0876 **	2.2957 **	1.9215	3.7875 ***	0.8286 *	0.8326 *	0.6723 *
	(0.978)	(0.962)	(3.171)	(1.328)	(0.441)	(0.449)	(0.363)
Robust	-0.7863	-1.8028	-5.1033	-0.8496	0.2075 ***	0.2048 ***	0.2860 ***
	(0.933)	(1.342)	(4.539)	(2.531)	(0.060)	(0.062)	(0.000)
GMM	1.3408 **	1.2528 **	-4.4231	-0.1617	-0.7544	-0.7478	-0.9983
	(0.626)	(0.558)	(4.268)	(1.754)	(0.608)	(0.613)	(0.741)
Other estimators	-0.0990	0.1594	-5.2094	-2.8225 **	-1.5535	-1.5501	-1.6639
	(1.108)	(1.211)	(3.392)	(1.310)	(1.424)	(1.440)	(1.616)
IV/2SLS/3SLS	1.5612 **	1.7472 ***	2.9496 ***	3.3598 ***	0.9065	0.9042	1.0008
	(0.598)	(0.587)	(0.859)	(0.814)	(0.701)	(0.711)	(0.694)
Equation type (Models other than those listed below)							
Difference model	-1.2991	-0.6362	-2.0804	-2.1004	0.0855	0.0731	dropped
	(0.944)	(1.061)	(2.667)	(2.081)	(1.115)	(1.126)	
Translog model	-0.8055	-1.0512	0.1991	0.3761	1.1589 *	1.1543 *	1.3711 **
	(0.804)	(0.643)	(1.760)	(1.173)	(0.624)	(0.634)	(0.685)
Treatment for selection bias of privatized firms							
Treatment for selection bias	-0.5153	-0.7592	2.3313	-0.5754	-0.6892	-0.6861	-0.7751
	(0.651)	(0.696)	(3.139)	(1.183)	(0.706)	(0.715)	(0.741)
Control variable							
Market competition	-2.7113	-1.5213	-13.6355 ***	-11.9281 ***	-1.1599	-1.1921	0.4533 ***
	(2.390)	(1.761)	(2.905)	(3.184)	(1.860)	(1.909)	(0.171)
Location fixed effects	-0.7484	-1.3697 **	-2.7487	-0.9830	-0.4930	-0.5029	-0.0181
	(0.744)	(0.648)	(2.853)	(1.501)	(0.767)	(0.781)	(0.704)
Industry fixed effects	0.2455	0.4171	-0.2908	0.4904	-0.1793	-0.1748	-0.4431
	(0.468)	(0.420)	(2.378)	(0.872)	(0.475)	(0.481)	(0.595)
Time fixed effects	1.1740	2.0236 *	5.2024	3.1381 *	-0.2195	-0.2038	-1.3290 ***
	(0.887)	(1.053)	(3.733)	(1.801)	(0.823)	(0.836)	(0.497)
Degree of freedom and research quality							
√ Degree of freedom	0.0016	0.0098 **	0.0092 **	0.0026	-0.0017	-0.0017	-0.0029
	(0.009)	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
Quality level	0.1408 *	-	0.1100	0.0577	0.2337	0.2330	dropped
	(0.076)	(-)	(0.255)	(0.156)	(0.146)	(0.148)	
Intercept	233.5547 ***	298.0966 **	1113.6080 ***	484.5310 **	386.0540 *	384.5987 *	402.9054
	(88.720)	(127.200)	(265.629)	(231.082)	(212.575)	(213.771)	(324.859)
K	1517	1517	1517	1517	1517	1517	1517
R^2	0.252	0.332	0.751	0.549	-	0.086	0.008

Notes:

[a] Breusch–Pagan test: $\chi^2=56.66$, $p=0.000$

[b] Hausman test: $\chi^2=58.32$, $p=0.001$; F test: $F=6.15$, $p=0.000$

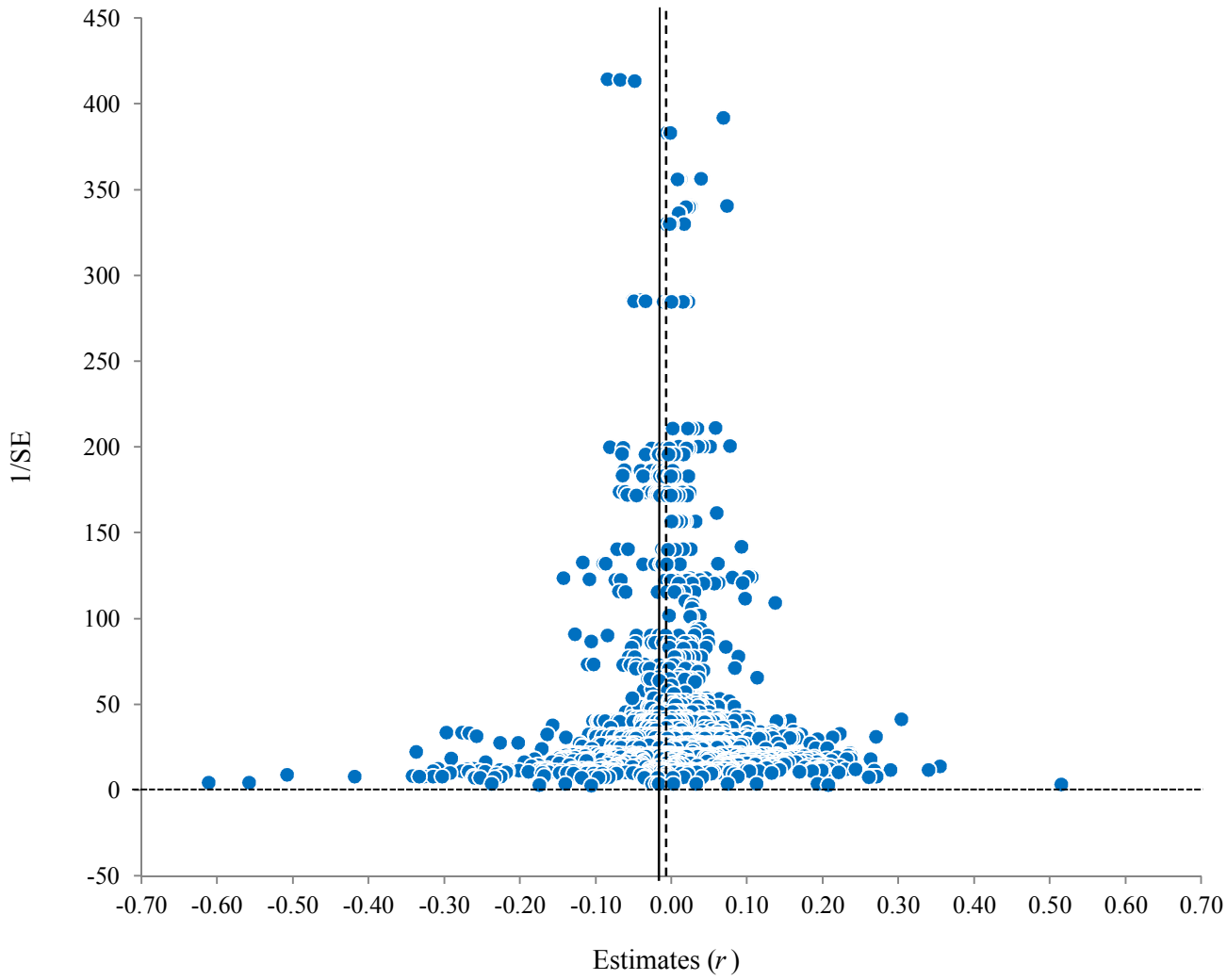
[c] Breusch–Pagan test: $\chi^2=108.72$, $p=0.000$

[d] Hausman test: $\chi^2=28.65$, $p=0.803$; F test: $F=10.23$, $p=0.000$

Figures in parentheses beneath the regression coefficients are robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimations; See Table 3 for the definition and descriptive statistics of meta-independent variables.

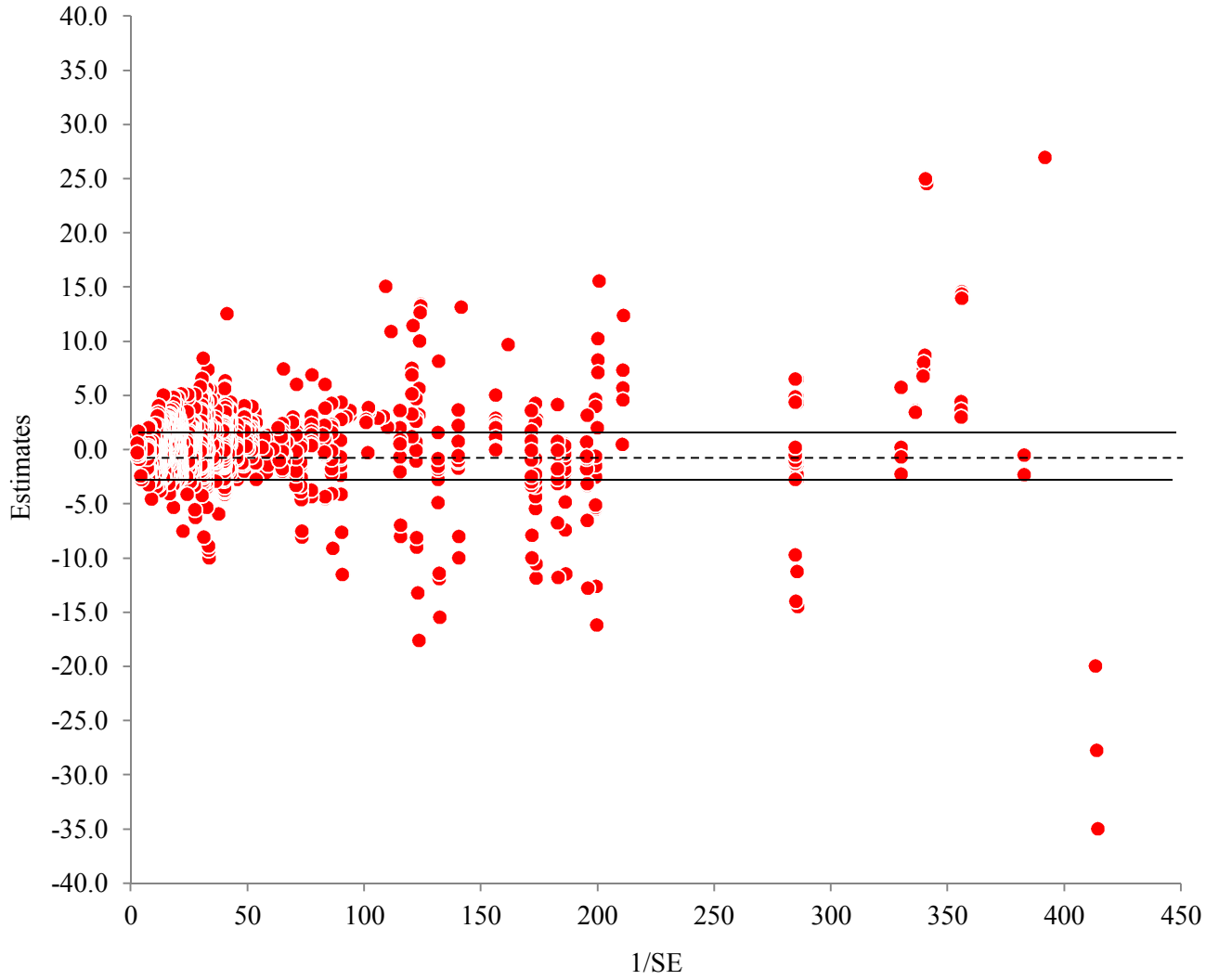
Figure 3. Funnel plot of patial correlation coefficients (K=1517)



Note: Solid line indicates the mean of the top 10% most precise estimates, -0.00102.

Source: Authors' illustration

Figure 4. Galbraith plot of t values (K=1517)



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

Source: Authors' illustration

Table 5. Meta-regression analysis of publication selection

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

Estimator	OLS	Cluster-robust OLS	Cluster-robust random-effects panel GLS
Model	[1]	[2]	[3] [a]
Intercept (FAT: H_0: $\beta_0=0$)	0.2971 *	0.2971	0.9146 ***
	(0.171)	(0.425)	(0.339)
$1/SE$ (PET: H_0: $\beta_1=0$)	0.0007	0.0007	-0.0047
	(0.004)	(0.014)	(0.006)
K	1517	1517	1517
R^2	0.0001	0.0001	0.0001

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

Estimator	OLS	Cluster-robust OLS	Cluster-robust fixed-effects panel LSDV
Model	[4]	[5]	[6] [b]
Intercept (H_0: $\beta_0=0$)	0.9840 ***	0.9840 ***	1.6965 ***
	(0.110)	(0.187)	(0.043)
$1/SE$	0.0233 ***	0.0233 ***	0.0097 ***
	(0.003)	(0.005)	(0.001)
K	1517	1517	1517
R^2	0.2889	0.2889	0.2889

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

Estimator	OLS	Cluster-robust OLS	Random-effects panel ML
Model	[7]	[8]	[9]
SE	1.7804	1.7804	-2.4383
	(1.100)	(3.251)	(3.444)
$1/SE$ (H_0: $\beta_1=0$)	0.0026	0.0026	-0.0038 *
	(0.003)	(0.011)	(0.002)
K	1517	1517	1517
R^2	0.0051	0.0051	-

Notes:

[a] Breusch-Pagan test: $\chi^2=2992.47$, $p=0.000$; Hausman test: $\chi^2=1.81$, $p=0.178$; F test: $F=16.65$, $p=0.000$

[b] Breusch-Pagan test: $\chi^2=179.24$, $p=0.000$; Hausman test: $\chi^2=42.53$, $p=0.000$; F test: $F=7.35$, $p=0.000$

Figures in parentheses beneath the regression coefficients are standard errors. Except for Model [9], robust standard errors are estimated. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.