

Analysis of the Effects of Debtor-in-Possession on Performance of the Distressed Firms: Evidence from Korea

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This study examines the impact of Korea's debtor-in-possession (DIP) system on the performance of distressed firms after 10 years of implementation. While the DIP system was introduced in Korea to encourage distressed firms to file for rehabilitation by guaranteeing management rights, there have been discussions on improving the system. The results show that DIP firms have a lower degree of earnings management than non-DIP firms, but there is no significant difference in financial performance. Overall, Korea's DIP system and related policies may need to be revisited to ensure they achieve their goals.

JEL Classification: G30, G34, G38

Key words: Korea, Debtor-in-Possession, Firm Performance, Earnings Management, Propensity Score Matching, SGMM

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I. Introduction

After the 1997 financial crisis, many Korean firms that experienced temporary financial difficulties avoided filing for formal bankruptcy proceedings due to concerns about losing their management rights. In response, Korea adopted a debtor-in-possession (DIP)¹⁾ system in 2006, which guaranteed management rights to firms undergoing rehabilitation. However, with more cases of incumbent managers abusing the DIP system to retain their positions, discussions about improving the system have intensified.²⁾

The studies on the effects of the DIP system have been already conducted in the United States since the 1990s. This is because during the 1980s, the number and size of companies filing for Chapter 11 bankruptcy in the United States increased rapidly, leading to a debate about whether the cause of this phenomenon could be attributed to the DIP system stipulated in Chapter 11. Critics of Chapter 11 contend that it is an overly debtor-friendly process that grants incumbent management too much controlling power and fails to liquidate a significant number of economically inefficient firms (Baird, 1986; Bebchuk, 1988, 2000; White, 1989, 1994; Bradley and Rosenzweig, 1991; Jensen, 1991; Aghion et al., 1992; Aivazian and Zhou, 2012).

Meanwhile, analyzing the effects of the DIP system has become similar to analyzing the efficiency of Chapter 11 bankruptcy law. This is because the definition of efficiency of bankruptcy law is an ideal concept³⁾ that is difficult to be tested empirically, as pointed out by

1) The DIP system allows a corporation that has filed for bankruptcy to remain in possession of its property even though a creditor has a lien or similar security interest (The United States Department of Justice, 2013).

2) There are several frequently cited examples of misconduct related to bankruptcy filings in Korea. One example involves the immediate sale of commercial paper just before *LIG's* filing in 2011. Another example concerns the debt repayment by affiliates of *Woongjin Holdings* one day prior to its 2013 filing. A third example is the buying of commercial paper by five affiliates of the *Dongyang Group* before its 2013 filing.

3) The fundamental efficiency question about bankruptcy law is whether it effectively

Aivazian and Zhou (2012). Researches into the efficiency of Chapter 11 through the effect of the DIP system is mixed, and there has been ongoing debate about the efficiency of the U.S. Chapter 11 process. Papers that argue Chapter 11 is inefficient include Gilson (1997), Hotchkiss (1995), Hotchkiss and Mooradian (1997), and LoPucki and Whitford (1993b). Papers that show the opposite results include Aivazian and Zhou (2012), Altman et al. (1999), Eckbo and Thorburn (2003), Evans et al. (2014), and Kalay et al. (2007). Meanwhile, Alderson and Betker (1999) found that firms neither underperformed nor outperformed following a Chapter 11 reorganization.

However, the discussions on the efficiency of Chapter 11 in the United States are based on that country's bankruptcy laws, which presuppose a separation of ownership and management. Specifically, in the United States, where ownership and management are clearly separated, distressed firms often undergo management (DIP) turnovers after filing for bankruptcy during periods of poor performance (Betker, 1995; Gilson, 1989; Gilson and Vetsuypens, 1993; Lin et al., 2020; LoPucki and Whitford, 1993a; Warner et al., 1988; Weisbach, 1988). This has led to numerous studies on the role of management (DIP) in the Chapter 11 process (Lin et al., 2020). Therefore, in Korea, where such a separation is not well-established (Yoo, 2010), a different analytical framework is necessary to examine the effect of DIP or the efficiency of bankruptcy laws, one that differs from existing empirical analyses.

Given this theoretical background, the purpose of this paper is to evaluate the efficiency of bankruptcy laws by analyzing the DIP system itself instead of the management (DIP) turnover in the United States, which can be challenging to evaluate when ownership and management are not well-separated. The paper specifically examines whether the court-appointed DIP system improved firm performance compared to non-DIP companies. To achieve this, a large dataset of bankrupt firms

rehabilitates economically efficient, but financially distressed, firms and liquidates economically inefficient firms (Hotchkiss et al., 2008).

was manually organized into the DIP and non-DIP systems.⁴⁾ If there is no substantial difference in firm performance between DIP firms and non-DIP companies, then the DIP system or bankruptcy law may not be considered efficient.

This paper contributes to the existing literature on the efficiency of bankruptcy laws as follows. Firstly, it fills a gap in the literature by analyzing the efficiency of the DIP system in Korea, where ownership and management are not clearly separated. Secondly, in addition to examining a firm's financial performance, this paper also considers earnings management⁵⁾ as a dependent variable. This is important because in Korea, where ownership and management are not distinct, managers in the rehabilitation process (i.e., the DIP system) may adjust earnings and face moral hazards.⁶⁾

The findings of this study are that while firms under the DIP system exhibit a lower degree of earnings management than non-DIP firms, there is no statistically significant difference in the financial performance of DIP and non-DIP firms. Therefore, the results suggest that Korea's DIP

4) Kwak et al. (2016) conducted an analysis of the impact of manager retention on post-bankruptcy performance using Korean data. The data was obtained from firms that filed for formal bankruptcy reorganization during the 2006–2013 period and sourced from KISVALUE. However, KISVALUE does not provide information on whether firms undergoing the rehabilitation process are appointed to the DIP system, resulting in a limitation where it is unclear whether manager retention refers to actual debtor-in-possession as per the Debt Rehabilitation and Bankruptcy Act. Further details on the KISVALUE data are available in footnote 14 on page 86.

5) If ownership and management are well-separated, incumbent managers or DIPs are less likely to engage in earnings management due to the potential for management changes. However, if ownership and management are not well-separated, the internal control system may be weak, and incumbent managers or DIPs may have greater incentives to engage in earnings management. Despite this logical linkage, few previous studies have examined the earnings management of incumbent managers. Meanwhile, Fischer et al. (2019) conducted a related study and argued that earnings management before bankruptcy significantly reduces the likelihood of Chapter 11 plan confirmation and emergence as a going concern from Chapter 11. While their study provides valuable insights, they did not explore the relationship between the DIP system and the earnings management of companies undergoing the rehabilitation process. Therefore, further research is needed to examine this topic in the future.

6) Although some may argue that earnings management measures are only relevant for typical firms and not applicable to bankrupt firms that are facing severe financial constraints, several studies have used earnings management measures for bankrupt companies (Agrawal and Chatterjee, 2015; Bisogno and De Luca, 2015; Li et al., 2020).

system is generally unlikely to be efficient.

There are two possible interpretations of the financial performance results. The first interpretation is that incumbent management has little incentive to operate faithfully due to Korea's corporate ownership structure, where ownership and management are not separate. Under this structure, weak internal control systems make it difficult to replace or penalize poorly performing controlling shareholders or managers (Ko, 2007; Park, 2008; Yoo, 2010). The second one is that the DIP system may be challenging to implement seamlessly because a U.S.-style DIP system was introduced without sufficient consideration of its impact on the corporate rehabilitation process in Korea (Kim, 2018).⁷⁾ When interpreting the earnings management results, any significant decreases of earnings management under the DIP firms to that of non-DIP firms should be interpreted with caution. This is because if the earnings management of non-DIP firms is significantly higher than that of DIP firms, then even if the earnings management of DIP firms increases, it may still be negative when compared to non-DIP firms. Indeed, according to Article 74 (2) of the DRBA, non-DIP firms are those where financial distress is caused by misappropriation or concealment of properties by poor management, which means that non-DIP firms can engage in a significant amount of earnings management when filing for bankruptcy.

However, this study notes several limitations to this approach. Firstly, the results of this study only apply to the behavior of Korean firms, which means that this information cannot be generalized to a broader context. Secondly, there is likely to be selection bias in the results as the study excluded some certified copies of corporate registrations that could not be assigned to either the treatment or the control group due to a delay in the court's administrative document processing system after filing.⁸⁾

7) Hotchkiss et al. (2008) argue that one important and still mainly unanswered question is how different institutional characteristics of individual countries interact with their respective insolvency rules.

8) See page 86-87 for a more detailed explanation.

Thirdly, the study does not analyze the post-bankruptcy performance of DIP firms as some prior literature does. Instead, this study focuses on comparing the performances of DIP and non-DIP firms, as comparing the two is more critical than comparing the post-bankruptcy performance of DIP firms and typical companies given the purpose of introducing the DIP system in Korea. Thus, this study's sample includes firms undergoing the bankruptcy process, such as those that have been merged and still-in-bankruptcy firms, as well as companies that have finished the bankruptcy process, such as those that have been liquidated and emerged as new firms after the Debt Rehabilitation and Bankruptcy Act was enacted in 2006. In this case, there may be bias in the estimation results since the firms are not undergoing the bankruptcy process. Specifically, for liquidated firms, since there is no financial data after liquidation, no matching occurs, and the data are dropped from the sample. For emerged firms, there is a possibility of good financial performance before and after emerging. Thus, if the number of emerged firms in the treatment group is larger than that of the control group, there is an upward bias in the estimate. However, according to the sample statistics used in this paper (see Table 1), the number of firms that emerged during the sample period was 322 out of a total of 1,277 firms, and the number of companies that were liquidated was 55 out of a total of 219 firms. This means that there is a potential upward bias in the treatment group estimates. However, as a result of the estimation, the estimate of the control group is larger than that of the treatment group in most performance indicators, indicating that the upward bias of the treatment group's estimate is not significant enough to change the estimation results. Nevertheless, note that the estimation results have a bias, and the results should be interpreted with caution.

The remainder of the paper is organized as follows. Section II explains the institutional background related to the DIP system in Korea, while Section III presents the primary empirical results and robustness checks

along with the data used in the analysis and a discussion. Finally, Section IV concludes the paper.

II. Institutional Background

1. Changes in Bankruptcy Laws and the DIP System

After the 1997 financial crisis, the International Monetary Fund (IMF) required the modernization of Korea's bankruptcy laws in return for financial support.⁹⁾ As a result, in 2006, the Debt Rehabilitation and Bankruptcy Act¹⁰⁾ (DRBA) was enacted, which merged the three existing types of corporate bankruptcy procedures (the Corporate Reorganization Act, the Composition Act, and the Liquidation Act).

The DRBA's primary contents included the elimination of the Composition Act, the implementation of the DIP system, the reinforcement of creditors' consultative councils, and the establishment of a bankruptcy court. The most significant alteration in the law was the introduction of the DIP system, which transformed Korean bankruptcy laws from a more creditor-friendly receivership system to a more debtor-friendly management-stays-in-place system (Schoenherr and Starmans, 2019).

Before the DRBA was enacted, under the Corporate Reorganization Act, a court-appointed receiver would take over the management rights of a company in financial distress. However, after the DRBA was enacted in 2006, the court would generally appoint the debtor company's current manager as custodian, except in cases where the existing manager was the direct cause of the company's financial problems. This change was introduced to encourage incumbent managers to file for rehabilitation

9) For more information on the legislative history of the DRBA, refer to Ko (2007) and to Schoenherr and Starmans (2019).

10) See the DRBA articles at https://elaw.klri.re.kr/eng_mobile/viewer.do?hseq=46315&type=sogan&key=9.

in the early stages of financial distress and to make use of their business knowledge and experience during the bankruptcy proceedings (Ko, 2007). As a result, firms in financial distress were typically appointed to the DIP system, with rare exceptions making them non-DIP firms.

Meanwhile, the number of companies in the DIP system rose rapidly from nine in 2006 to 162 in 2011, before decreasing to 146 in 2016 (see Table 1). This increase was due to the enactment of the DRBA. As of October 2016, 85.4% of the 1,496 companies that filed for bankruptcy had been part of the DIP system.

<Table 1> Debtor-in-Possession (DIP) System

Year	Number of Rehabilitation Processes (or Rehabilitated)	DIP	
		Under DIP	Non-DIP
2006	12 (0.8)	9 (75.0)	3 (25.0)
2007	22 (1.5)	19 (86.4)	3 (13.6)
2008	75 (5.0)	64 (85.3)	11 (14.7)
2009	117 (7.8)	99 (84.6)	18 (15.4)
2010	107 (7.2)	95 (88.8)	12 (11.2)
2011	189 (12.6)	162 (85.7)	27 (14.3)
2012	187 (12.5)	165 (88.2)	22 (11.8)
2013	170 (11.4)	149 (87.6)	21 (12.4)
2014	217 (14.5)	188 (86.6)	29 (13.4)
2015	213 (14.2)	181 (85.0)	32 (15.0)
2016	187 (12.5)	146 (78.1)	41 (21.9)
Sum	1,496 (100.0)	1,277 (85.4)	219 (14.6)

Note: 1) The values in parentheses indicate the percentages relative to the total. Out of a target of 1,706 firms undergoing a rehabilitation process, 210 firms are excluded due to uncertainty regarding their inclusion in the DIP system.

Source: Supreme Court Internet Registry (author's calculation)

2. Corporate Rehabilitation Procedures Under the DRBA

The DRBA provides details on the actual operation of the DIP system for firm rehabilitation procedures.¹¹⁾ The process begins with a filing, which is typically done by the debtor company's management. However, other stakeholders, including creditors and shareholders holding more than 10% of the company's equity value, may also file.

Once the court formally commences the rehabilitation proceedings, a creditor consultative council is established, and a receiver is appointed. The creditors' consultative council's primary role is to monitor the company's operations during the bankruptcy process. The DRBA includes explicit provisions to strengthen the council's role. The receiver is appointed by the court when it formally decides to begin corporate rehabilitation proceedings. The receiver serves as the debtor company's general manager and administrator. Previously, before the DRBA's enactment, the court practice was to dismiss the incumbent manager of the debtor company and choose a receiver from independent, third-party candidates. However, with the DRBA's enactment, the court, in principle, appoints the debtor company's incumbent manager as the receiver, except in exceptional circumstances where the cause of the debtor's financial deterioration can be attributed to the existing management.

Finally, the court has discretion when dealing with distressed companies and their liquidation values. If the liquidation value exceeds the going concern value, the court may determine not to proceed with the rehabilitation procedures and instead require the liquidation of corporate assets.

III. Empirical Analysis

1. Methodology

This study uses the propensity score matching (PSM) method to analyze

11) The procedures are mainly quoted from Ko (2007).

the effect of DIP on the performance of the distressed firms. Regarding how to choose covariates, this paper considers the covariates¹²⁾ in Table 2, rather than focusing on one or two characteristics, such as operating income and return on sales, following Aivazian and Zhou (2012), since there might be substantial heterogeneity among firms in the reasons for filing for bankruptcy.¹³⁾

The considered model specifications include the following: a single nearest neighbor matching method, the inverse probability of treatment weighting (IPTW), advanced inverse probability of treatment weighting (AIPTW), and the minimum-biased (MB) estimator developed by Millimet and Tchernis (2012). In addition, the system generalized method of moments (SGMM) is employed as an alternative identification strategy for a robustness check.

2. Data

This study examines 1,496 bankruptcy filings retrieved from KISVALU E¹⁴⁾ at the end of October 2016, representing nonfinancial corporations subject to external audits by the Act on External Audit of Stock Companies in Korea. Certified copies of corporate registrations¹⁵⁾ were purchased from the corporate registry at the Supreme Court internet registry office to identify which of the companies were court-appointed DIP companies. After excluding 210 companies due to uncertainty about their DIP status,

12) Refer to the following Data section for information concerning data.

13) Initially, Hotchkiss (1995) used an industry and performance-adjusted measure to select a control group. Specifically, Hotchkiss (1995) selected firms in the same standard industrial classification (SIC) industries as the bankrupt firm and with performance within 10% of the bankrupt firm's performance at the fiscal year-end preceding the Chapter 11 filing. Other related studies include Alderson and Betker (1999), Andrade and Kaplan (1998), Denis and Rodgers (2007), Kalay et al. (2007), Maksimovic and Phillips (1998), and Zhang (2010).

14) KISVALUE has established a database of financial indicators for firms under bankruptcy, which includes data from gazettes of the Supreme Court in Korea and newspaper articles. It is important to note that the 1,496 companies under bankruptcy may not represent the entire population of bankruptcy filings for the relevant period.

15) A certified copy of the corporate registration is an official document that includes the purpose of the corporation, the name of the corporation, its main location, directors, and equity issued to establish a company under the Commercial Law in Korea.

a total of 1,496 bankruptcy filings were used as samples for this study, with annual data ranging from 2006 to 2016. This dataset has panel data similar to Aivazian and Zhou (2012), which applies the PSM methodology to the panel data. Also, like Aivazian and Zhou (2012) and Black et al. (2016), this study does not provide a lag for the variables.¹⁶⁾

The process of dividing sample firms into treatment and control groups is as follows. A firm is considered a court-appointed DIP company and included in the treatment group when its certified copy of corporate registration contains the following sentence under the Board of Directors section: "Where no custodian is appointed, the debtor (referring to the debtor's representative where the debtor is not an individual) shall be deemed the custodian provided for in the provisions of this part (Article 74 (4) of the DRBA)." If the incumbent manager is dismissed, and another is appointed as a custodian, the firm is appointed a non-DIP company and included in the control group.

The dependent variables are the manager's earnings management and the firm's financial performance. As earnings management cannot be observed, abnormal accruals from the modified Jones model are used as a proxy variable for earnings management (Dechow et al., 1995). However, it must be noted that using abnormal accruals as a proxy variable for earnings management is not theoretically established (Black et al., 2021). Thus, following Black et al. (2021),¹⁷⁾ this study selects the standardized earnings adjustment (SEA) (total accruals/basic total assets) variable and the abnormal accruals as the earnings management variables.

This paper performs a regression analysis, as depicted in equation (1), by regressing the total accruals for each industry and year on covariates

16) For the treatment variable (DIP_t), a model is also estimated using DIP_{t-1} because it may take a certain amount of time from the court's designation of the DIP to the realization of the earnings management and financial performance. Even if estimating using DIP_{t-1} , the values of the estimated earnings management and financial variables do not change significantly (see Table 4 and Appendix 4). Therefore, DIP_t is used.

17) Black et al. (2021) utilize a Jones, Dechow, and Larcker model, which is an extended and modified version of the Jones model. Yet, they achieve similar results as the modified Jones model.

that can predict total accruals. Out of the 44 industries categorized based on the two-digit division of the Korean Standard Industrial Classification, only 21 industries with a minimum of 30 or more firms are included in the analysis.

Meanwhile, in equation (1), ta is total accruals, $\frac{ta_{i,t}}{assets_{i,t-1}}$ is SEA, rec is accounts receivable, and ppe refers to property, plant, and equipment.

$$\frac{ta_{i,t}}{assets_{i,t-1}} = \beta_{i,1} \left(\frac{1}{assets_{i,t-1}} \right) + \beta_{i,2} \left(\frac{\Delta sales_{i,t} - \Delta rec_{i,t}}{assets_{i,t-1}} \right) + \beta_{i,3} \left(\frac{ppe_{i,t}}{assets_{i,t-1}} \right) + \epsilon_{i,t} \quad (1)$$

Coefficients of these regressions are used to predict each firm's normal accruals, as shown in equation (2), where na is normal accruals.

$$na_{i,t} = \widehat{\beta}_{i,1} \left(\frac{1}{assets_{i,t-1}} \right) + \widehat{\beta}_{i,2} \left(\frac{\Delta sales_{i,t} - \Delta rec_{i,t}}{assets_{i,t-1}} \right) + \widehat{\beta}_{i,3} \left(\frac{ppe_{i,t}}{assets_{i,t-1}} \right) \quad (2)$$

The remaining accruals are termed abnormal and reflect earnings management, as seen in equation (3), where aa refers to abnormal accruals.

$$aa_{i,t} = \left(\frac{ta_{i,t}}{assets_{i,t-1}} \right) - na_{i,t} \quad (3)$$

Regarding a firm's financial performance, similar to related research, this study uses ROA, ROE, investments, sales operating (OP) margin, and the Interest Compensation Ratio (ICR).

According to Rosenbaum and Rubin (1983) (see Table 2), covariates are selected by adding and subtracting different combinations of variables until the distribution of covariates balance between the treatment and control groups is similar. Covariates are selected if there is an overlap in the distribution of propensity scores of the dependent variables estimated by the logit model before and after matching. Furthermore, a year dummy variable is included in the model to control for time fixed effects. Also, since there may be outliers in the variables of companies undergoing rehabilitation, this study removes the extreme 10% of the

data (winsorizing). However, even after removing the extreme 1% and 5% of the data (winsorizing), the results hardly changed.¹⁸⁾

<Table 2> Variable Definitions

Variable	Description
Dependent Variables	
SEA	Total accruals/basic total assets
Abnormal accruals	Total accruals-normal accruals
ROA	Return on asset
ROE	Return on equity
Investments	CAPEX ¹⁾ /total assets
Sales OP margin	Operating profit/sales
ICR	Operating profit/interest expense
Treatment Variable	
DIP System	Under DIP=1, Non-DIP=0
Covariates	
Ln (total assets)	Firm size
EBIT/sales	Earnings before interest and taxes/sales
CAPEX ¹⁾ /plant assets	
Export portion	Export portion of firms entered in KISVALUE (domestic firm=0)
Market share	Sales percentage of firms belonging to the same industry, as total sales (Based on the two-digit division of the Korean Standard Industrial Classification)
Plant assets/sales	
Debt ratio	Total debt/total assets
Sales growth rate	Annual growth rate of sales
Tangible asset growth rate	Annual growth rate of tangible assets
Net income	
Net working capital/total assets	(Current asset-current debt)/total assets
Operating cash flow/basic total assets	
Year dummy	2006-2016 (reference year=2006)

Note: 1) CAPEX refers to capital expenditures for future profits, calculated by subtracting the cash inflow from investing activities in the cash-flow statement. Plant assets refer to the sum of buildings, equipment, construction, molds, machinery, fixtures, ships & aircraft, facilities, and vehicles.

18) The results are not presented here due to space limits, but they can be provided upon request.

〈Table 3〉 Summary of Descriptive Statistics

Variable	Obs	Mean	SD	Min	Max
Dependent Variables					
SEA	7,740	-0.062	0.154	-0.326	0.180
Abnormal accruals	6,785	-0.042	0.212	-0.417	0.282
ROA	10,207	-2.034	10.326	-21.9	11.84
ROE	7,781	3.109	21.743	-39.14	36.34
Investments	5,830	0.283	0.525	-0.142	1.719
Sales OP margin	10,054	-2.053	12.040	-26.96	10.38
ICR	9,922	1.042	3.287	-3.92	7.94
Treatment Variable					
DIP system	14,366	0.411	0.492	0	1
Covariates					
Ln (total assets)	10,181	23.975	1.235	21.857	26.057
EBIT/sales	8,490	1.686	11.294	-20.00	16.00
CAPEX/plant assets	6,141	3.529	7.298	-1.267	23.724
Export portion	14,366	0.158	0.486	0.000	1.67
Market share	10,044	0.014	0.058	0.000	0.873
Plant assets/sales	9,965	0.255	0.270	0.008	0.828
Debt ratio ¹⁾	8,120	0.832	8.402	0.000	570.97
Sales growth rate ¹⁾	9,823	0.078	0.345	-0.371	0.839
Tangible asset growth rate ¹⁾	9,895	0.107	0.363	-0.297	1.028
Net income ¹⁾	10,211	-0.753	3.537	-7.819	4.302
Net working capital/total assets	9,780	-0.017	0.275	-0.456	0.414
Operating cash flow/basic total assets	8,451	0.013	0.096	-0.149	0.182

Note: 1) The net income is divided by 1 billion, the debt ratio is 1,000, and sales and tangible asset growth rates are 100 to avoid non-convergence when estimating MLE.

3. Single Nearest Neighbor Matching

First, this study uses the single nearest neighbor matching method to estimate the treatment effects. The propensity score is obtained by estimating a logit model with the variables listed in Table 4 and the annual

data from 2006 to 2016. Meanwhile, it is worth noting that this study does not select the covariates for the logit model based on the sign or statistical significance of the estimated covariate coefficients. Rather, this study follows Rosenbaum and Rubin (1983), which adds or subtracts various variables until achieving a balanced distribution of covariates between the treatment and control groups before and after the matching.¹⁹⁾ The estimation results of the logit model are provided in Appendix 1.

After matching, the degree of overlap between the propensity score of the two groups is examined, and the results show that the distribution of propensity scores overlap well, satisfying the common support assumption, also known as the overlap assumption (see Appendix 2). Next, the distribution of covariates before and after the matching is similar in the balancing test between the groups.²⁰⁾

Table 4 presents the estimated impact of the DIP system on distressed firms using the single nearest neighbor matching method. The ATT of SEA and abnormal accruals are -0.103 and -0.077, respectively.²¹⁾ The results are statistically significant at the 1% level. Furthermore, the profitability of firms under the DIP system is worse than that of non-DIP companies. The ATT values for both ROA and ROE are statistically significant at the 5% level, with -1.243 and -2.635, respectively. However, the ATT of investments and sales OP margin is -0.048 and -0.357, respectively, and are not statistically significant. Additionally, while ICR is 0.182, there is no statistical significance.

19) There is a difference of opinion among scholars as to the selection of covariates for propensity score estimation. Brookhart et al. (2006) and Senn et al. (2007) warn against including covariates that affect the treatment variable, but not the dependent variable, as it could lead to biased logit estimation results. Conversely, not including unobserved confounding covariates in the logit model may result in greater bias in the estimation than using all observable covariates. Rosenbaum and Rubin (1983) recommend selecting covariates repeatedly until achieving a balanced distribution of covariates between the treatment and control groups.

20) The results are not presented here due to space limits, but they can be provided upon request.

21) This paper uses the standard error of Abadie and Imbens (2016), which takes into account the estimation error of the logit model for estimating propensity scores. The related Stata codes use the [teffects] command.

(Table 4) Single Nearest Neighbor Matching Results (ATT)

	SEA	Abnormal accruals	ROA	ROE	Investments	Sales OP margin	ICR
DIP System	-0.103*** (-8.25)	-0.077*** (-3.92)	-1.243** (-3.00)	-2.635** (-2.48)	-0.048 (-0.89)	-0.357 (-0.71)	0.182 (1.08)

Note: 1) The values in parentheses are the z -statistics, and the Abadie and Imbens (2016) standard error is used.

2) *** $p < 0.01$, ** $p < 0.05$

4. Propensity Score Weighting

The control group in this paper has a smaller number of firms compared to the treatment group, which raises the possibility of not finding a control group with a similar propensity score to the treatment group (Smith, 1997). To mitigate the difference in group numbers, this study uses the IPTW and AIPTW estimation methods to obtain the ATE and ATT using the propensity score as a weight.²²⁾ The IPTW is a weighted propensity score, and the AIPTW is a weighted measure of both the outcome variable and the propensity of the treatment group. In general, the propensity score can be used as the weight to alleviate the problem when the score of the treatment group is higher than that of the control group. This study examines whether the overlap assumption is satisfied when using the IPTW and AIPTW methods. The overlapping images of the IPTW and AIPTW methods demonstrate that they are appropriately matched (see Appendix 5).²³⁾

After the propensity score estimation, a balancing test is conducted for each covariate using the raw and weighted standardized (mean) difference²⁴⁾ and variance ratio²⁵⁾ as proposed by Austin (2009) (see Table

22) If the propensity score is p , the weight for the treatment group is $1/p$, and the weight for the control group is $1/(1-p)$. For more information, refer to Morgan and Todd (2008).

23) The overlapping images of the AIPTW are similar to those of the IPTW. However, due to space limitations, the results are not presented here. They can be provided upon request.

24) The standardized difference is calculated by dividing the difference in the mean of a variable between the treated and control groups by an estimate of the standard deviation of that variable.

25) The variance ratio is the ratio of the variance in the treated group to the variance in the control group.

5).²⁶⁾ Theoretically, a random assignment would result in a weighted standardized difference of 0 and a variance ratio of 1. According to Table 5, the raw standardized difference before weighting ranges from 0.215 to 0.012 in absolute terms, but the weighted standardized difference indicates that covariate balance has been achieved, as the values for all covariates are almost 0. In terms of the variance ratio, the weighted variance ratio seems to have improved to some extent compared to the raw variance ratio. However, except for market share, plant assets/sales, debt ratio, and net income and net working capital/total assets, none of the weighted variance ratios have values close to 1. According to Stuart (2010), a variance ratio of 1 in weighted samples indicates a good covariate balance, and a variance ratio between 0.5 and 2 is generally acceptable.

〈Table 5〉 Inverse Probability of Treatment Weighting (IPTW) Covariate Balance Test

	Standardized Difference		Variance Ratio	
	Raw	Weighted	Raw	Weighted
Ln (total assets)	0.123	0.001	1.159	1.133
EBIT/sales	-0.053	0.001	0.940	0.895
CAPEX/plant assets	-0.052	0.004	0.998	1.134
Export portion	-0.012	-0.001	0.945	0.971
Market share	0.028	-0.002	1.071	1.048
Plant assets/sales	-0.050	-0.002	0.984	1.045
Debt ratio	-0.102	0.001	0.967	1.077
Sales growth rate	-0.181	0.005	0.871	0.985
Tangible asset growth rate	-0.215	0.006	0.677	0.892
Net income	-0.091	-0.001	1.239	1.037
Net working capital/total assets	-0.079	0.001	1.110	1.080
Operating cash flow/basic total assets	0.019	-0.004	0.905	0.910

Note: 1) Raw (weighted) refers to the standardized mean differences (mean of treated group-mean of control group) or the variance ratio (variance of treated group/variance of control group) without (with) the weight.

²⁶⁾ A covariate balance test may be performed using statistical inference, but, in this case, unmatched samples may be dropped and the test results may be incorrect (Imai et al., 2008).

The weighted variance ratio of data falls within that range, indicating that the covariate balance test in terms of the variance ratio is generally sufficient. In conclusion, the propensity score weighting method demonstrates that a more balanced control group can be achieved.

Table 6 shows that in the IPTW estimation, the SEA and abnormal accruals have respective ATTs of -0.108 and -0.086, which are statistically significant at the 1% level. The profitability indicators, such as ROA (-1.016) and ROE (-2.641), have a significantly negative ATT. Additionally, the ATT of investment is -0.122, which is statistically significant at the 5% level. However, there is no significant difference in sales OP margin and ICR between the treatment and control groups. The AIPTW estimates also demonstrate a similar pattern to the IPTW estimates.

〈Table 6〉 IPTW and AIPTW Estimation Results¹⁾

	SEA	Abnormal accruals	ROA	ROE	Investments	Sales OP margin	ICR
IPTW: ATT							
DIP System	-0.108*** (-10.28)	-0.086*** (-5.50)	-1.016*** (-4.57)	-2.641*** (-4.21)	-0.122** (-3.25)	0.432 (1.20)	0.009 (0.07)
AIPTW: ATE ²⁾							
DIP System	-0.112*** (-10.55)	-0.086*** (-5.47)	-1.044*** (-4.60)	-2.778*** (-4.05)	-0.125 (-3.40)	0.227 (0.69)	0.015 (0.13)

Note: 1) The values in parentheses are the z -statistics, and the Abadie and Imbens (2016) standard error is used.

2) AIPTW only shows the ATE in Stata.

3) *** $p < 0.01$, ** $p < 0.05$

5. Minimum-Biased Estimator

The court's discretion with regard to Article 74 (2) of the DRBA, which may vary,²⁷⁾ is considered an unobservable feature when the court categorizes filing firms as DIP firms or non-DIP firms. Considering this possibility, this study utilizes new estimators for ATE and ATT to minimize bias without instrumental variables. The minimum-biased (MB) estimator, developed by Millimet and Tchernis (2012), reduces bias by using observations around the bias-minimizing propensity scores.²⁸⁾ If one assumes that the set of observations included in the estimate is Ω , then the variable, which determines the lower and upper bounds of the treatment group and the control group included in the Ω , will be called θ . In this study, θ is set as 5% and 25% (Millimet and Tchernis, 2012). As θ decreases, the bias becomes smaller due to more observations around the bias-minimizing propensity score, but the variance increases. The estimation's confidence interval is set to 95% by repeating the process 250 times using the bootstrap method.²⁹⁾ If the confidence interval includes 0, the point estimate is not statistically significant.

The ATT estimates of SEA are significantly negative for both MB and MB-EE,³⁰⁾ with θ set at 5% and 25%, as shown in Table 7. For MB and MB-EE, the abnormal accruals are also significantly negative with θ set at 25%. However, the confidence interval of the MB and MB-EE estimates

27) Article 74 (Selection and Appointment of Custodians) of the DRBA

(2) The court shall appoint individual debtors and debtors' non-individual representatives as custodians with the exception of the following instances:

1. When the debtor's financial distress is caused either by misappropriation or concealment of properties by any of the following persons or by poor management substantially attributable to such person: (a) an individual debtor; (b) the director of a non-individual debtor; or (c) the manager of the debtor;
2. When the request from the Creditors' Consultative Council has any justifiable grounds;
3. When the debtor's rehabilitation is necessary.

28) See Millimet and Tchernis (2012) for the MB estimate derivation process. For the related Stata codes, see McCarthy et al. (2014).

29) This study employs Stata codes from McCarthy et al. (2014), and the results remain unaffected by any variation in the number of repetitions.

30) The Edgeworth Expansion (EE) is a method that enhances the accuracy of convergence in asymptotic theory.

of ROA with θ at 5% and 25%, respectively, includes 0. The sign of the ROE MB estimate is also significantly negative only when θ is set at 25%. In terms of investments, the sign of both the MB and MB-EE estimates is significantly negative only when θ is set at 25%. However, the MB and MB-EE estimates are not significant for sales OP margin and ICR. All variables' ATE are similar to ATT, except for ROE with 25% of MB and MB-EE.

(Table 7) Minimum-biased (MB) Estimation Results

Variable	ATE	ATT
SEA		
MB		
0.05	-0.090 [-0.172, -0.017]	-0.087 [-0.168, -0.021]
0.25	-0.107 [-0.135, -0.069]	-0.106 [-0.133, -0.070]
MB-EE		
0.05	-0.058 [-0.181, -0.022]	-0.093 [-0.170, -0.021]
0.25	-0.106 [-0.138, -0.072]	-0.105 [-0.135, -0.069]
Abnormal accruals		
MB		
0.05	-0.115 [-0.186, 0.024]	-0.111 [-0.188, 0.014]
0.25	-0.091 [-0.140, -0.036]	-0.092 [-0.137, -0.042]
MB-EE		
0.05	-0.112 [-0.185, 0.014]	-0.116 [-0.192, 0.018]
0.25	-0.078 [-0.137, -0.042]	-0.087 [-0.138, -0.040]
ROA		
MB		
0.05	-0.269 [-4.491, 1.550]	-1.548 [-4.811, 1.295]
0.25	-0.687 [-2.112, 0.136]	-1.041 [-2.280, 0.061]
MB-EE		
0.05	-1.282 [-4.729, 1.401]	-0.888 [-4.913, 1.199]
0.25	-1.021 [-2.140, 0.059]	-0.886 [-2.346, 0.117]
ROE		
MB		
0.05	-2.765 [-9.808, 3.114]	-3.677 [-9.666, 1.985]
0.25	-2.088 [-5.203, 0.267]	-2.328 [-5.285, -0.065]
MB-EE		
0.05	-3.273 [-9.249, 1.909]	-3.006 [-9.101, 2.146]
0.25	-2.405 [-5.552, -0.091]	-1.286 [-5.374, 0.044]

Variable	ATE	ATT
Investments		
MB		
0.05	-0.174 [-0.319, 0.153]	-0.167 [-0.333, 0.124]
0.25	-0.115 [-0.241, -0.026]	-0.118 [-0.239, -0.026]
MB-EE		
0.05	-0.174 [-0.372, 0.095]	-0.174 [-0.329, 0.111]
0.25	-0.115 [-0.244, -0.027]	-0.099 [-0.237, -0.008]
Sales OP margin		
MB		
0.05	1.427 [-2.863, 4.552]	0.657 [-2.813, 5.072]
0.25	1.283 [-0.392, 2.414]	1.361 [-0.242, 2.649]
MB-EE		
0.05	0.687 [-3.043, 4.788]	0.784 [-2.788, 4.927]
0.25	1.312 [-0.784, 2.537]	1.363 [-0.295, 2.614]
ICR		
MB		
0.05	-0.310 [-1.343, 0.727]	-0.475 [-1.275, 0.690]
0.25	-0.106 [-0.500, 0.442]	-0.080 [-0.516, 0.425]
MB-EE		
0.05	-0.504 [-1.262, 0.833]	-0.410 [-1.272, 0.676]
0.25	-0.080 [-0.501, 0.481]	-0.122 [-0.533, 0.427]

Note: 1) 0.05 and 0.25 are used as θ values.

2) The Edgeworth Expansion (EE) is a method of increasing the accuracy of convergence in the asymptotic theory. A bootstrapped standard error is used, and next to each MB and MB-EE estimate is the respective 95% confidence interval.

6. Robustness Check

This study employs the system GMM method (SGMM) as an alternative identification strategy, which is preferred over other dynamic panel models due to its smaller finite sample bias. The SGMM allows for more precise estimates, as shown by Baltagi (2008).

The SGMM estimation equation consists of the level equation of equation (4) and the differential equation of equation (5), including the first lagged dependent variable. The estimator is derived by minimizing the objective function that forms the moment conditions of the two equations in the form of simultaneous equations. Dependent variables

$(y_{i,t})$ are the same as the PSM type model (see Table 8). A $dip_{i,t}$ is a treatment variable indicating whether a company is appointed to the DIP system. The control variables ($X_{i,t}$) are the same as prior PSM type analyses, following Black and Kim (2012). Time-fixed effects ($Time_{i,t}$) are added to control the effects of macro shocks, such as business cycles, while firms undergoing bankruptcy are less likely to be sensitive to macro factors, such as monetary policy and interest rates, since they typically focus on rehabilitation procedures, such as asset and debt evaluations. Thus, they are not included as control variables. The time-invariant fixed effect δ_i indicates unobserved individual heterogeneity.

$$y_{i,t} = \alpha_0 + \alpha_1 dip_{i,t} + \alpha_2 y_{i,t-1} + \alpha_3 X_{i,t} + \alpha_4 Time_{i,t} + \delta_i + \epsilon_{i,t} \quad (4)$$

$$\Delta y_{i,t} = \alpha_1 \Delta dip_{i,t} + \alpha_2 \Delta y_{i,t-1} + \alpha_3 \Delta X_{i,t} + \Delta \epsilon_{i,t} \quad (5)$$

When estimating an SGMM, selecting the appropriate lag length of instrumental variables is crucial due to the weak instrument problem. This study selects lag 2 to lag 4 for the GMM type instrumental variable of each model following Arze del Granado et al. (2013) and Roodman (2009). The SGMM model diagnosis includes checking for autocorrelation in the error term (AR (2) test) and overidentifying restrictions (Hansen's J -test). The null hypothesis of no autocorrelation in the error terms is rejected in AR (1), but not in AR (2), for six dependent variables. Hansen's J -test, which tests whether all instrumental variables are exogenous, fails to reject the null hypothesis for all models.

The analysis shows that the coefficient of SEA is -0.069, which is statistically significant at the 5% level. However, it does not have a statistically significant impact on abnormal accruals. Additionally, there are no statistically significant estimates for ROA, ROE, investments, sales OP margin, and ICR. To confirm this, a static panel model, namely the fixed effects model, random effects model, and the first-difference model, is used for estimation. The results obtained are similar to those obtained using the SGMM.³¹⁾

(Table 8) SGMM Estimation Results

	SEA	Abnormal accruals	ROA	ROE	Investments	Sales OP margin	ICR
$y_{i,t-1}$	0.047 (0.078)	0.184* (0.107)	0.031 (0.031)	0.088** (0.04)	0.190** (0.086)	0.216 (0.151)	0.244*** (0.044)
Dip	-0.069** (0.028)	0.025 (0.037)	-0.596 (1.149)	2.286 (3.474)	0.002 (0.054)	2.031 (3.080)	0.503 (0.330)
Size	-0.004 (0.012)	-0.011 (0.022)	-0.205 (0.43)	0.759 (1.115)	-0.044 (0.028)	-0.489 (0.977)	0.011 (0.176)
EBIT/sales	0.001 (0.001)	0.002 (0.001)	0.036* (0.021)	0.087 (0.060)	-0.002 (0.002)	-0.020 (0.075)	0.005 (0.009)
CAPEX/plant assets	-0.002 (0.003)	-0.006 (0.004)	-0.012 (0.062)	0.259 (0.198)	-0.001 (0.005)	-0.156 (0.156)	-0.020 (0.030)
Export portion	-	-	-	-	-	-	-
Market share	0.349 (0.329)	0.985 (0.765)	0.843 (6.396)	-39.10 (25.69)	1.780 (1.669)	2.781 (95.73)	-0.788 (3.268)
Plant assets/sales	0.038 (0.040)	0.052 (0.084)	-1.725 (1.178)	-4.037 (3.537)	0.158 (0.117)	-4.212 (3.74)	-0.880* (0.488)
Debt ratio	0.000 (0.003)	0.002 (0.002)	-0.136 (0.11)	-1.365*** (0.443)	0.002 (0.005)	-0.220 (0.517)	-0.087* (0.049)
Sales growth Rate	0.03 (0.029)	0.016 (0.077)	1.871 (1.158)	6.100* (3.608)	0.006 (0.055)	10.380 (7.447)	2.356*** (0.419)
Tangible asset growth rate	0.008 (0.028)	-0.031 (0.055)	-0.230 (1.231)	1.113 (3.433)	-0.011 (0.062)	1.539 (3.071)	0.032 (0.405)
Net income	0.002 (0.003)	-0.001 (0.004)	1.844*** (0.136)	4.177*** (0.319)	0.004 (0.006)	1.463*** (0.273)	0.292*** (0.045)
Net working capital/total assets	0.023 (0.039)	-0.031 (0.083)	0.103 (1.262)	-0.721 (3.912)	0.049 (0.087)	-0.920 (6.527)	0.984** (0.493)
Operating cash flow/basic total assets	-0.124 (0.123)	-0.088 (0.149)	4.655 (3.292)	19.570** (9.779)	-0.296 (0.356)	-1.890 (13.53)	-0.520 (1.704)
Cons	0.000 (0.000)	0.212 (0.541)	0.000 (0.000)	0.000 (0.000)	1.213* (0.657)	12.730 (21.84)	0.000 (0.000)
Obs	1,292	1,115	2,332	2,167	1,116	2,330	2,266
AR (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
AR (2)	0.337	0.594	0.962	0.413	0.744	0.379	0.168
Hansen's J -test	0.994	0.980	0.489	0.513	0.83	0.969	0.960

Note: 1) The values in parentheses are the modified standard error of Windmeijer (2005).

2) The values in AR (1), AR (2), and Hansen's J -test are p -value.

3) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

31) Due to space constraints, the outcomes of each static panel model estimation are not included in this paper. However, they can be made available upon request.

7. Summary of Estimation Results and Discussion

The findings of the five estimation methods are summarized in Appendix 6. The results indicate that all SEA estimates are significantly negative, and abnormal accruals are also significantly negative, except for the SGMM. This outcome implies a significant decrease in earnings management by firms in the DIP system. Regarding a firm's financial performance, the DIP system results in some negative outcomes in their ROA, ROE, and investment aspects.³²⁾ The DIP system had little impact on sales OP margin and ICR relative to non-DIP firms. Therefore, the results suggest that Korea's DIP system is generally unlikely to be efficient.

There are two possible interpretations of the financial performance results. The first interpretation is specific to Korea, where the corporate ownership structure does not separate clearly. This structure creates little incentive for incumbent management to operate faithfully, making it challenging to replace or penalize poorly performing controlling shareholders or management due to weak internal control systems (Ko, 2007; Park, 2008; Yoo, 2010). Therefore, it is possible that if firms facing bankruptcy continue to have management rights through the DIP system, the existing managers responsible for bankruptcy may continue to manage the firms poorly due to insufficient internal control systems, such as monitoring and disciplinary mechanisms. This inference is supported by many qualitative studies, such as legal papers on the DIP system's improvement, and some National Assembly members are pushing for an initiative to revise the DIP system law (Yoo, 2010). The second, more general, interpretation is that the DIP system may be challenging to operate harmoniously in Korea because the U.S.-style DIP system was introduced without sufficient consideration of the impact on the domestic

32) It is possible that the DIP system may have a negative impact on financial indicators, such as ROA and ROE, even if the treatment group shows good indicators, as the control group may temporarily improve the indicators due to the replacement of the existing manager. However, upon examining the raw data, it is observed that both the treatment and control groups experience a continuous decline in ROA and ROE after 2006, which refutes the aforementioned conjectures.

corporate rehabilitation process (Kim, 2018). Although the basic framework of Korea's bankruptcy laws consists of characteristics of creditor-friendly civil law, the DIP system embedded in the bankruptcy laws has debtor-friendly features. Accordingly, the rehabilitation procedures within the bankruptcy laws cannot operate as a single and coherent system.

When interpreting the results of earnings management, caution should be provided in interpreting any significant decreases in earnings management under DIP firms compared to non-DIP firms. This is because if the earnings management of non-DIP firms is significantly higher than that of DIP firms, any increase in earnings management of DIP firms may still be negative when compared to non-DIP firms. According to Article 74 (2) of the DRBA, non-DIP firms are those where financial distress is caused by misappropriation or concealment of properties due to poor management, which means that non-DIP firms can engage in significant earnings management when filing for bankruptcy.

IV. Conclusion

This study analyzes the effect of the debtor-in-possession (DIP) system on the performance of distressed firms more than 10 years after its introduction in 2006. While the DIP system was introduced in Korea to encourage firms to file for rehabilitation by guaranteeing management rights, there have been discussions on improving the system.

The findings of this study show that firms under the DIP system exhibit lower levels of earnings management than non-DIP firms, but there is no statistically significant difference in the financial performance of DIP and non-DIP firms. Therefore, the results suggest that Korea's DIP system is generally unlikely to be efficient.

These results suggest the following implications. While the DIP system may work in theory, it appears to provide less actual benefit in practice,

as it does not allow firms under bankruptcy to quickly return to normal standing. This highlights a potentially flawed implementation of the process in Korea. To improve the DIP system, it may be necessary to address the inadequate efforts of incumbent managers to rehabilitate their firms by potentially shifting the power structures granted by the DIP system.

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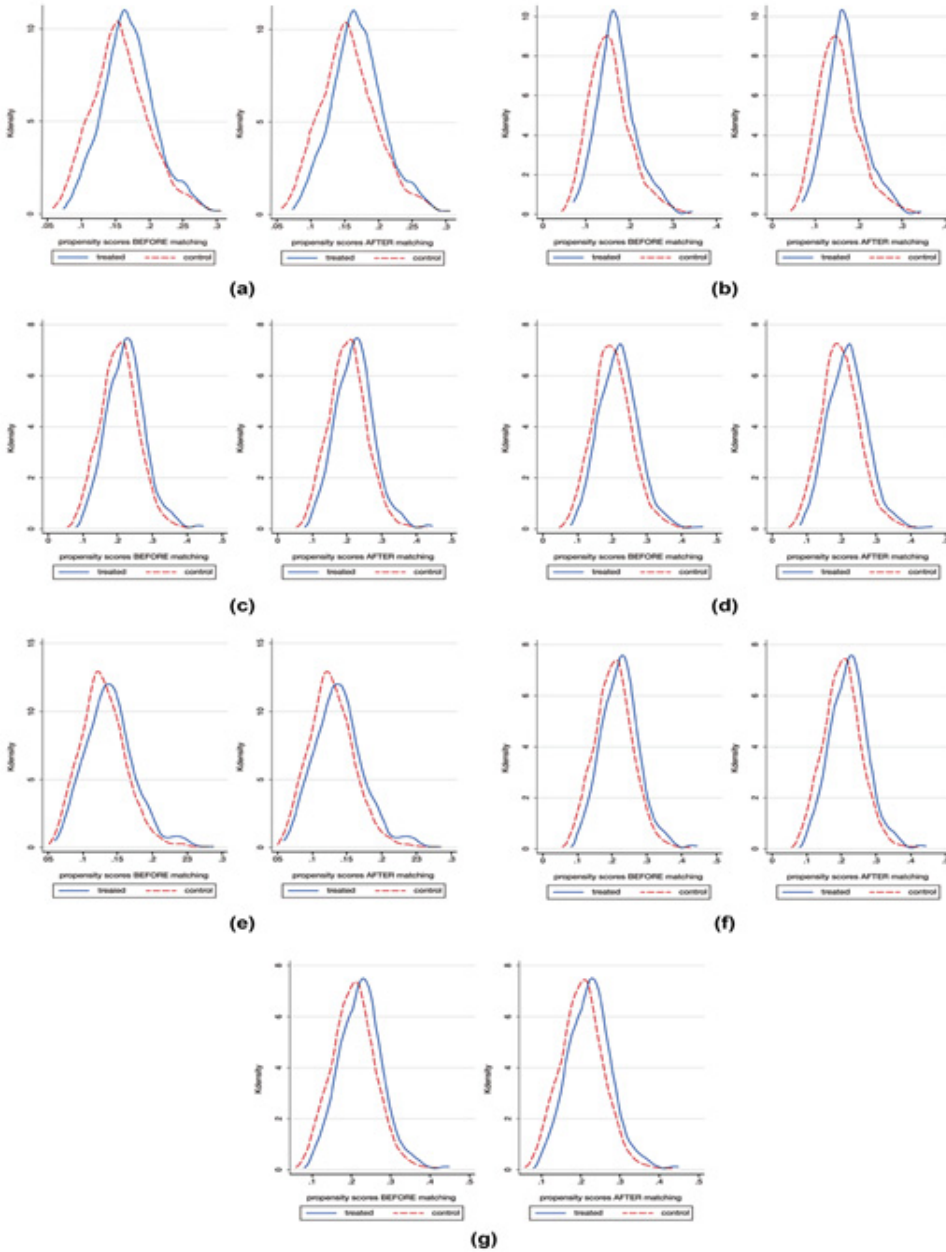
〈Appendix 1〉 Result of Logit Regression

	SEA	Abnormal accruals	Investments	ROA	ROE	Sales OP margin	ICR
Ln (total assets)	0.190** (2.27)	0.219** (2.47)	0.170** (1.79)	0.170*** (2.72)	0.152** (2.57)	0.156*** (2.71)	0.154*** (2.66)
EBIT/sales	0.002 (0.40)	0.002 (0.32)	-0.006 (-0.81)	-0.006 (-0.26)	-0.002 (-0.34)	-0.001 (-0.26)	-0.002 (-0.56)
CAPEX*/ plant assets	-0.006 (-0.50)	-0.006 (-0.49)	-0.001 (-0.09)	-0.001 (-1.12)	-0.010 (-1.24)	-0.009 (-1.10)	-0.007 (-0.87)
Export portion	0.194 (1.53)	0.256* (1.81)	0.030 (0.20)	0.030 (-0.33)	-0.049 (-0.48)	-0.033 (-0.33)	-0.023 (-0.23)
Market share	-27.24* (-1.99)	-32.09** (-2.19)	-14.23 (-0.97)	-14.23 (-1.71)	-11.42 (-1.29)	-13.30 (-1.53)	-12.85 (-1.47)
Plant assets/ sales	-0.200 (-0.72)	-0.446 (-1.46)	0.060 (0.19)	0.060* (-1.71)	-0.337* (-1.71)	-0.317* (-1.66)	-0.31 (-1.61)
Debt ratio	-0.418 (-1.29)	-0.691* (-1.91)	-0.424 (-1.16)	-0.424*** (-3.09)	-0.846*** (-3.45)	-0.693*** (-3.04)	-0.688*** (-2.99)
Sales growth rate	-0.206 (-0.99)	-0.155 (-0.70)	-0.116 (-0.48)	-0.116*** (-2.43)	-0.360** (-2.31)	-0.358** (-2.38)	-0.378** (-2.47)
Tangible asset growth rate	-0.488** (-2.49)	-0.437** (-2.12)	-0.476** (-2.19)	-0.476*** (-3.55)	-0.441*** (-3.14)	-0.499*** (-3.62)	-0.494*** (-3.56)
Net income	-0.017 (-0.74)	-0.016 (-0.02)	-0.036 (-1.40)	-0.036 (-1.46)	-0.026 (-1.57)	-0.022 (-1.41)	-0.022 (-1.38)
Net working capital/total assets	-0.239 (-0.82)	-0.530* (-1.66)	-0.057 (-0.17)	-0.057** (-2.35)	-0.626*** (-2.98)	-0.461** (-2.27)	-0.495** (-2.41)
Operating cash flow/ basic total assets	-0.134 (-0.19)	-0.063 (-0.08)	0.126 (0.16)	0.126 (0.20)	0.132 (0.26)	0.096 (0.20)	0.090 (0.18)
Cons	-5.872*** (-2.94)	-6.434*** (-3.04)	-5.722*** (-2.53)	-5.722*** (-3.37)	-4.489*** (-3.19)	-4.592*** (-3.37)	-4.546*** (-3.31)
Obs	1,661	1,452	1,485	2,765	2,662	2,763	2,707
Pseudo R^2	0.02	0.02	0.01	0.02	0.02	0.02	0.02

Note: 1) The values in parentheses are the t -statistics.

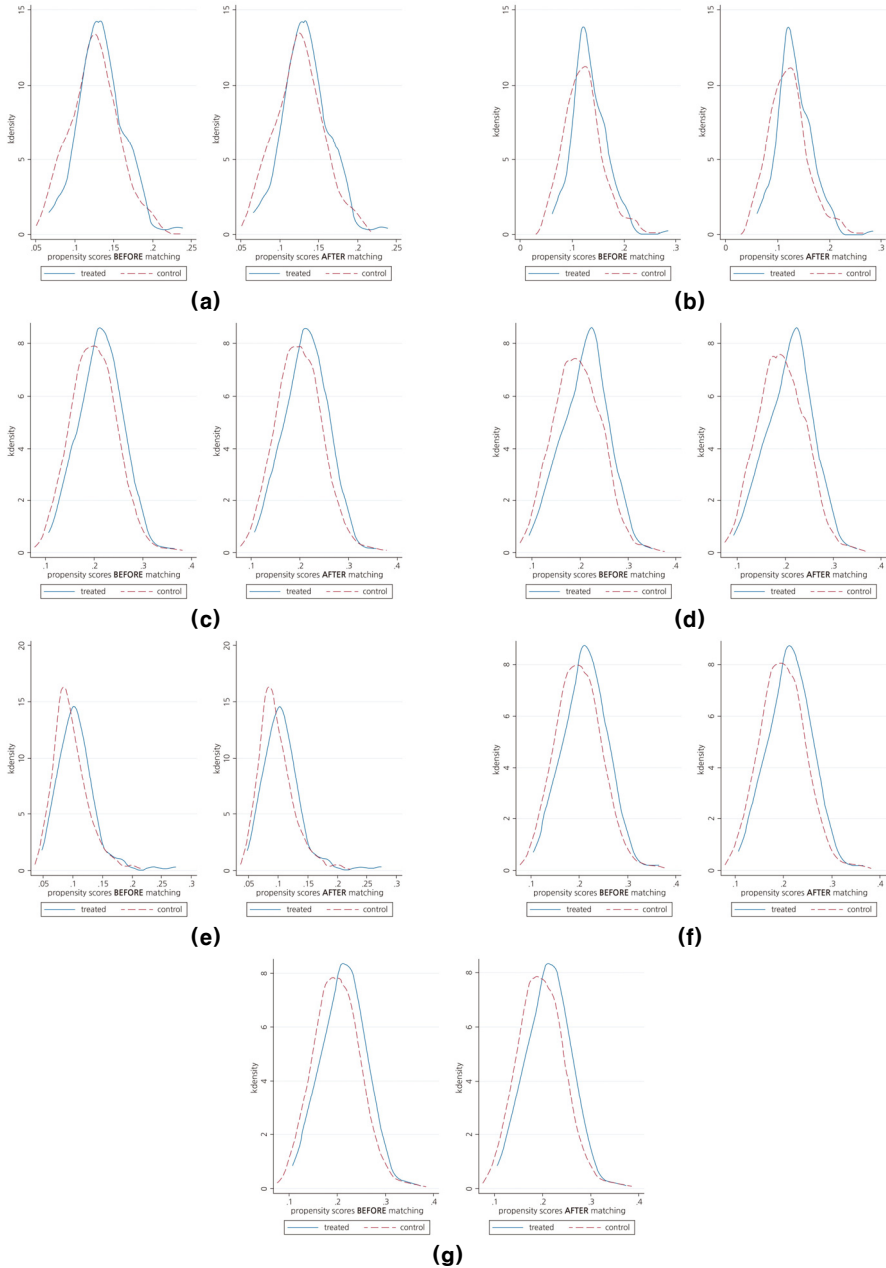
2) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

<Appendix 2> The Distributions of Propensity Score before and after the Single Nearest Neighbor Matching (DIP_t)



Note: (a) SEA, (b) Abnormal Accruals, (c) ROA, (d) ROE, (e) Investments, (f) Sales OP Margin, and (g) ICR. The horizontal axis is the propensity score, and the vertical axis is the kernel density. The left graph of each variable is the propensity score distribution before matching, while the right is the propensity score distribution after matching. The solid blue line (treated) is the distribution of the treatment group, and the red dotted line (control) is the distribution of the control group.

〈Appendix 3〉 The Distributions of Propensity Score before and after the Single Nearest Neighbor Matching (DIP_{t-1})



Note: (a) SEA, (b) Abnormal Accruals, (c) ROA, (d) ROE, (e) Investments, (f) Sales OP Margin, and (g) ICR. The horizontal axis is the propensity score, and the vertical axis is the kernel density. The left graph of each variable is the propensity score distribution before matching, while the right is the propensity score distribution after matching. The solid blue line (treated) is the distribution of the treatment group, and the red dotted line (control) is the distribution of the control group.

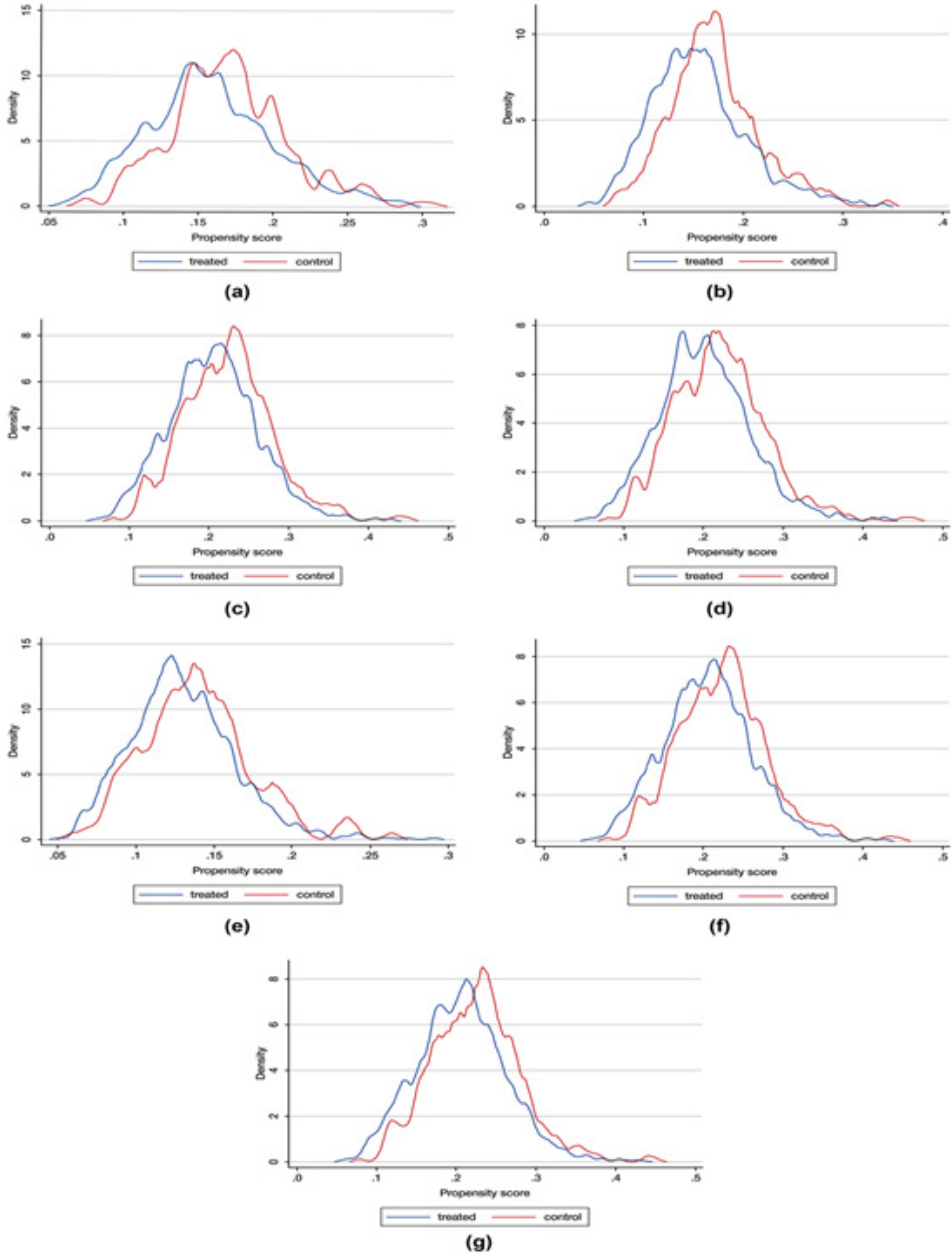
〈Appendix 4〉 Single Nearest Neighbor Matching Results (DIP_{t-1})

	SEA	Abnormal accruals	ROA	ROE	Investments	Sales OP margin	ICR
DIP	-0.039**	-0.007	-0.750	-4.419***	-0.128*	-0.026	0.100
System	(0.02)	(0.03)	(0.52)	(1.30)	(0.06)	(0.71)	(0.21)

Note: 1) The values in parentheses are the z -statistics, and the Abadie and Imbens (2016) standard error is used.

2) *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

〈Appendix 5〉 The Distribution of Propensity Score of Inverse Probability of Treatment Weighting (IPTW)



Note: (a) SEA, (b) Abnormal Accruals, (c) ROA, (d) ROE, (e) Investments, (f) Sales OP Margin, and (g) ICR. The horizontal axis is the propensity score, and the vertical axis is the kernel density. The blue line (treated) represents the estimated density of the probability of receiving a DIP appointment, and the red line (control) represents the estimated density of the probability of not receiving a DIP appointment.

〈Appendix 6〉

Summary of Estimation Results

	SEA	Abnormal accruals	ROA	ROE	Investments	Sales OP margin	ICR
Single nearest	-0.103*** (-8.25)	-0.077*** (-3.92)	-1.243** (-3.00)	-2.635** (-2.48)	-0.048 (-0.89)	-0.357 (-0.71)	0.182 (1.08)
IPTW	-0.108*** (-10.28)	-0.086*** (-5.50)	-1.016*** (-4.57)	-2.641*** (-4.21)	-0.122** (-3.25)	0.432 (-1.2)	0.009 (-0.07)
AIPTW	-0.112*** (-10.55)	-0.086*** (-5.47)	-1.044*** (-4.60)	-2.778*** (-4.05)	-0.125*** (-3.40)	0.227 (0.69)	0.015 (0.13)
MB (ATT, 5%)	-0.087 [-0.168, -0.021]	-0.111 [-0.188, 0.014]	-1.548 [-4.811, 1.295]	-3.677 [-9.666, 1.985]	-0.167 [-0.333, 0.124]	0.657 [-2.813, 5.072]	-0.475 [-1.275, 0.690]
MB (ATT, 25%)	-0.106 [-0.133, -0.070]	-0.092 [-0.137, -0.042]	-1.041 [-2.280, 0.061]	-2.328 [-5.285, -0.065]	-0.118 [-0.239, -0.026]	1.361 [-0.242, 2.649]	-0.080 [-0.516, 0.425]
MB-EE (ATT, 5%)	-0.093 [-0.170, -0.021]	-0.116 [-0.192, 0.018]	-0.888 [-4.913, 1.199]	-3.006 [-9.101, 2.146]	-0.174 [-0.329, 0.111]	0.784 [-2.788, 4.927]	-0.410 [-1.272, 0.676]
MB-EE (ATT, 25%)	-0.105 [-0.135, -0.069]	-0.087 [-0.138, -0.040]	-0.886 [-2.346, 0.117]	-1.286 [-5.374, 0.044]	-0.099 [-0.237, -0.008]	1.363 [-0.295, 2.614]	-0.122 [-0.533, 0.427]
SGMM	-0.069** (0.028)	0.025 (0.037)	-0.596 (1.149)	2.286 (3.474)	0.002 (0.054)	2.031 (3.080)	0.503 (0.330)

Note: 1) The values in parentheses of the single nearest neighbor matching, IPTW and AIPTW are the z -statistics. Those of the SGMM are the t -statistics. Below each MB and MB-EE estimate is the respective 95% confidence interval.

2) *** $p < 0.01$, ** $p < 0.05$

DIP 제도의 부실기업 성과에 대한 효과 분석: 한국 사례를 중심으로

최영준*

본 연구는 한국에서 DIP 제도 시행 이후 10년이 경과한 시점에서 동 제도가 부실기업의 성과에 미치는 영향을 분석하였다. DIP 제도는 부실기업의 경영권을 보장하여 동 기업의 회생신청을 장려하기 위해 도입되었지만 동 시스템 개선에 대한 논의가 계속되었다. 분석결과 DIP 기업의 이익조정 정도는 non-DIP 기업대비 작아졌으나 재무성과는 두 기업 간에 차이가 없었다. 이러한 결과는 한국의 DIP 제도 및 관련 정책이 DIP 제도 도입 목적을 달성하기 위해 재검토될 필요가 있음을 시사한다.

JEL Classification: G30, G34, G38

핵심 주제어: 한국, 기존 경영자 관리인 제도, 재무성과, 이익조정, 성향점수 매칭, SGMM

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