Effectiveness of debt modification system in Korea

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Abstract

This study aims to examine the effectiveness of the debt modification system (DMS) in Korea. We find that DMS does have a positive effect in increasing the credit scores and annual income of DMS users. We also find that a debt management plan (DMP) is more effective in raising credit scores than personal rehabilitation (PR). However, the credit scores of DMS users in the first half of 2019 (551.1–626.1 points) are at a very low level, making it difficult to access low-interest unsecured loans from banks. Therefore, DMS in Kores is still insufficient to support the return of debt-ridden consumers to normal financial life and provide opportunities for a fresh start.

Keywords Debt modification system, Personal rehabilitation (Chapter 13), Debt management plan (DMP), Fresh start, Credit score

Paper type Research paper

1. Introduction

The number of debt modification system (DMS) [1] filings, which accounts for about 80% of personal debt relief filings in Korea, is recently increasing. In 2020, the total number of DMS filings is 215,305, which has increased by 15.3% from 186,719 in 2016. Meanwhile, household debt in 2020 records ₩1,727.4tn, which has increased by 43.6% from ₩1,203.1tn in 2015. The increase in household debt [2] will result in an increase in the number of delinquents amid an interest rate hike [3] to curb inflation, and it is expected that the number of DMS filings will increase further. Besides, when the deferred principal repayment measure [4] by the government and financial institutions implemented since April 2020 ends, it is feared that the number of DMS filings will also sharply increase along with the rapid increase in the number of credit defaulters. Despite the recent growing importance [5] of the DMS in Korea, little is known about its effectiveness. The principal theory of the DMS is to provide fresh start opportunities to overly indebted consumers through the partial discharge of past debts (Kang and Jung, 2013; Lee, 2015). Also, it is possible to deter the loss of national human capital through DMS by providing incentives to debt-ridden consumers to enable them to work (Kang and Jung, 2013; Oh, 2014). However, the argument that DMS is to provide fresh start opportunities to overburdened debtors has not been quantitatively tested in Korea yet because there were rarely empirical studies due to data limitations.

Using data provided by one of the major credit rating companies (NICE Information Service) in Korea, we explore the argument that DMS could provide fresh start opportunities to overburdened debtors and be possible to deter the loss of national human capital. Since debt-ridden consumers need to increase their income and credit score [6] to make an economic fresh start, this study uses changes in credit score and annual income as proxy variables for

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DMS effectiveness analysis. Using the difference-in-difference (DID) model and panel regression analysis model, we examine whether there is a significant difference in the increase in credit score and annual income between DMS users and credit defaulters who do not file for DMS (NFCD: non-filing credit defaulters [7]). We also analyze the difference in the effectiveness between the DMS groups.

This study's contributions are as follows. First, we examine the effectiveness of DMS through empirical comparison analyses based on the changes in credit score and annual income between DMS groups and non-filing credit defaulters for the first time. Second, we report evidence supporting the argument that DMS could provide fresh start opportunities to overburdened debtors. Third, we present the findings that DMS provides incentives for overburdened debtors to actively participate in the labor market and contributes to economic growth by creating added value. Finally, we suggest that as DMS is still insufficient to restore the financial health of debt-ridden consumers, it is necessary to promote system improvements such as shortening the repayment period of DMP and activating credit counseling.

The remainder of the study is organized as follows. Section 2 explains the institutional background of DMS and recent trends in DMS filings and household debts in Korea. Section 3 presents a summary of previous literature on DMS to provide a baseline for this study. Section 4 describes the data and the research methodology. Section 5 reports empirical analysis results. Section 6 concludes the paper.

2. Institutional background and trends of DRP filers

2.1 Institutional background

Debt relief programs (DRPs) support the return of overly indebted consumers to normal economic activity as soon as possible through the entire or partial discharge of their past debts (Kang and Jung, 2013; Lee, 2015). DRP also provides incentives to debt-ridden consumers to participate in the labor market (Kang and Jung, 2013). DRP can be divided into DMS and personal bankruptcy (Kang and Jung, 2013). DMS is a reconstruction-type debt relief system that adjusts the contents of debts, such as principal, interest and repayment period, to pay back debts for a certain period with the debtor's future income. DMS can be separated into personal rehabilitation (PR) by the court and debt management plan (DMP) as a private debt adjustment system by Credit Counseling and Recovery Service (CCRS) [8] (Kang and Jung, 2013).

2.1.1 Personal rehabilitation (PR). PR was introduced in Korea in 2004. Afterward, it was consolidated into the Debtor Rehabilitation and Bankruptcy Act in 2005. PR filing is eligible for debtors who earn regular income. The court orders individuals to surrender all of their earnings, excluding predetermined minimum living costs [9] for a certain period (Oh, 2014). Overburdened debtors must propose a plan to repay a portion of their debts by future earnings to creditors (Fay *et al.*, 2002). The repayment period is 5 years, and the remaining unsecured debts are discharged (Oh, 2015). The plan goes into effect when the bankruptcy judge accepts it (Fay *et al.*, 2002).

The coverage of debts for PR is all unsecured debts including taxes and healthcare bills. The eligible debt limit is ₩1bn for unsecured loans and ₩1.5bn for secured loans. The repayment period for PR was 5 years, but it was shortened to 3 years in June 2018. Debt-ridden consumers that file for a PR petition must also pay a bankruptcy court filing fee (about ₩437,000) and an attorney's fee (average ₩1.5m, between ₩1m and ₩2m) (See Table 1).

2.1.2 Debt management plan (DMP). DMP started as a private agreement among financial institutions in 2002 in order to respond to the rapidly increasing credit card delinquency problem (Oh, 2015). The DMP [10] supports debt-ridden consumers through debt adjustments, such as the extension of repayment deadline, split repayment, principal

	Personal rehabilitation (PR)	Debt management plan (DMP)
Organization in charge	Bankruptcy Court	CCRS
Eligible debtor	Insolvent debtor who has disposable monthly income	90 days overdue
Coverage of debts	All debts ※ Tax, healthcare bills and loans between individuals included	All debts owned by financial and loan companies that have joined "Credit Recovery Support Agreement" ※ Tax, loans from individuals not included
Debt limit	Unsecured debt: ₩1bn secured: ₩1.5bn	Unsecured debt: ₩0.5bn, secured debt: ₩1bn
Repayment period	Up to 5 years (Up to 3 years since June 13, 2018)	Up to 8 years (10 years for vulnerable people) * Secured debt: up to 35 years
Debt reduction	Pay the amount of non- exempt property at least. (61.4% on average in 2020)	Charged-off debts reduced by up to 70%, 90% for vulnerable people (37.6% on average in 2020)
Legal effect	Order of court (final judgment)	Contract between debtor and creditor
Public record on credit report	Kept for 5 years after court approval of repayment plan. (3 years since June 13, 2018)	Kept for 2 years after final agreement on DMP
Filing fees	· Commission fee: ₩30,000 · Transmission fee: ₩255,000 · Rehabilitation commissioner surcharge: ₩150,000	· Application fee ₩50,000
Attorney fees	· ₩1m–₩2m	· None

Source(s): Credit counseling and recovery service

Table 1.
Debt modification system (DMS) in Korea

reduction etc. Eligible debtors for the DMP must have a debt repayment that is more than three months overdue. Eligible debtors should have a monthly income that is no less than the minimum living costs. The unsecured debt repayment period by the DMP is generally up to 8 years, and up to 10 years for vulnerable people. Debt discharge ratios are as follows. Interest is fully exempted, and for principal, charged-off debts are reduced by up to 70 and 90% for socially vulnerable people. Public record information of the DMP remains on the credit report for 2 years. The application fee for the DMP is ₩50,000 without an attorney's fee.

2.2 Trends of DRP filings and household debt

Table 2 shows trends of DRP filings including personal bankruptcy (Chapter 7 of Title 11 US code) and DMS. Personal bankruptcy filings in 2007 accounted for 57.2% of DRP filings, more than that of DMS. However, as the court strengthened the hearing procedures to prevent moral hazard since 2008, the number of personal bankruptcy filings has decreased while the number of DMS users has increased significantly (Kang and Jung, 2013).

The number of DMS filings in 2020 is 215,305, which has increased by 15.3% from 186,719 in 2016, accounting for 81.0% of the DRP. Among them, the number of PR filings is 86,551 and the number of DMP applications is 128,754. At one time, the number of PR filings was higher than DMP users, but since 2016, the number of DMP users has maintained a higher level than PR filings. This phenomenon seems to be because the neutrality and fairness of the CCRS between overburdened debtors and creditors have been enhanced as the CCRS was re-launched as a statutory non-private institution based on The Microfinance Support Act in 2016.

Household debt in 2020 is ₩1,727.4tn, which has increased by 43.6% from ₩1,203.1tn in 2015. Unsecured loans including credit card loans are ₩720.9tn in 2020, which has risen by

	Debt relief programs (DRP)				
	Personal Bankruptcy	Debt modification system (DMS) PR	DMP	Subtotal	Household debt† (credit loans, etc.)
2006	123,691	56,155	85,826	141,981	607.1
2007	154,039(57.2)	51,416	63,706	115,122(42.8)	665.4(286.3)
2008	118,643	47,874	79,144	127,018	723.5(314.4)
2009	110,917	54,605	101,714	156,319	776.0(331.1)
2010	84,725	46,972	84,590	131,562	843.2(364.5)
2011	69,754	65,171	91,336	156,507	916.2(398.5)
2012	61,546	90,368	90,126	180,494	963.8(418.8)
2013	56,983(21.9)	105,885	97,139	203,024(78.1)	1,019.0(446.9)
2014	55,467	110,707	85,168	195,875	1,085.3(465.0)
2015	53,865	100,096	91,520	191,616	1,203.1(499.6)
2016	50,288	90,400	96,319	186,719	1,342.5(554.1)
2017	44,246	81,592	108,277	189,869	1,450.6(599.9)
2018	43,402	91,219	106,808	198,027	1,536.7(638.7)
2019	45,642(17.7)	92,587	119,437	212,024(82.3)	1,600.3(661.7)
2020	50,379(19.0)	86,551	128,754	215,305(81.0)	1,727.4(720.9)

Note(s): †Household debt composition (Ratio): Mortgage (52.7%) + Sales Credit (5.6%) + Credit loans (41.7%) etc
(Unit: Person, %, trillion)
Source(s): The Supreme Court of Korea, Credit Counseling and Recovery Service, Bank of Korea

Table 2.
Trends of DRP filings and household Debt

44.3% from ₩499.6tn in 2015. It is feared that the recent continued increase of household debt might make an impact on the rise of DMS filings.

3. Literature review

Previous studies on DRPs are largely divided into two types of topics. The first topic is on the primary causes and characteristics of DRP filings such as personal bankruptcy and DMSs. The second one is on the effectiveness of DRP and policy improvements to enhance the efficacy of those programs.

3.1 Causes and characteristics of debt relief filings

Since the early 1980s, the number of consumers who seek personal bankruptcy protection has increased dramatically in the United States, spurring extensive research to search for the causes of personal bankruptcy (Han and Li, 2011). Many scholars showed strong interest in examining two main questions about the causes of bankruptcy filings: Why do people file for bankruptcy? And what causes the US bankruptcy filings to increase so dramatically since 1980? White (2007a,b). One view of primary causes for personal bankruptcy filings is adverse life events such as job loss, medical problems and divorce. Representative researchers for the adverse life event hypothesis are Sullivan *et al.* (2006), Getter (2003) and Zhu (2011). Some Korean researchers also report findings that support the adverse life event hypothesis (Kim and Hwang, 2008; Park and Roh, 2017) [11].

Another view is that personal bankruptcy filers consider financial benefits and costs as rational consumers (Fay *et al.*, 2002; White, 1998, 2007a, b). Researchers in Korea also support the argument that debt-ridden consumers make a strategic decision based on costs and benefits comparison before they file for personal bankruptcy or PR (Park, 2008; Kim and Nam, 2009).

3.2 Effectiveness and policy suggestions

Scholars in the United States have argued that the principal theory of personal bankruptcy is to provide a fresh start [12] through debt discharge to honest but unfortunate debt-ridden customers (Hallinan, 1986; Waddell, 1991; Livshits *et al.*, 2003, 2007a,b). The Korean Court and

researchers are also associated with the theory of a fresh start through debt discharge (Kang and Jung, 2013; Lee, 2015). Meanwhile, some academics report the findings that the idea of a "fresh start" is part of the illusion of consumer bankruptcy, but perhaps not the reality for most of those who file, and that filing for bankruptcy does not have a positive impact on annual work hours for debtors after bankruptcy (Porter and Thorne, 2006; Han and Li, 2007, 2011). Other researchers present the findings that about one-third of consumers who have entered chapter 13 completed their repayment plans, and most of the debtors who dropped out of chapter 13 almost immediately started struggling with the same financial problems they had before filing for bankruptcy (Greene *et al.*, 2016).

Some academics in the United States reveal the findings that DMP is associated with positive effects on financial health and financial management behaviors of credit defaulters (Elliehausen *et al.*, 2003, 2007; Kim *et al.*, 2003, 2005; Wang, 2010).

4. Data and research methodology

4.1 Data

4.1.1 Data description and summary statistics. This study examines every half-year panel data for 20,000 DMS users by DMP and PR, 10,000 DMP users and 10,000 PR users, and 10,000 non-filing credit defaulters from the second half of 2014 to the first half of 2019 [13]. The data in the second half of 2014 are samples taken just before the public record information of DMS filers is registered on their credit report. The credit score and annual income immediately before the DMS usage of delinquent debtors using DMS are registered in public record information are important. This is because, in order to analyze the performance of DMS users, it is necessary to analyze how much the credit score and annual income of DMS users have changed relative to the credit score and annual income of credit defaulters who do not use DMS based on the credit score and annual income before using DMS. Therefore, this article can explore the performance based on the credit score and annual income change of debt-ridden consumers by the DMS groups and non-filing credit defaulters. The total number of samples in the dataset is 300,000 [14] for five years. This is a unique dataset provided by one of the major credit bureau companies (NICE INFO) in Korea. This dataset is composed of random samples [15] drawn from the individual debtors' original data after DMS filings and credit delinquencies. These data contain personal information such as the debtor's age and social security number and various financial-related details such as the debtor's accounts, loans and repayment amounts.

Financial companies consider personal credit scores [16] in the credit report as critical criteria when they assess the credit risk of debtors. Annual income information [17] of the DMS users and non-filing credit defaulters are statistics estimated by NICE INFO. The dataset has removed personal information such as name and social security number to ensure confidentiality.

Table 3 gives the information on the overall financial activities including credit scores [18] of DMS users and non-filing credit defaulters.

4.1.2 Credit score change by groups. The average credit score of DMP users has risen by 142 points from 484.1 in the second half of 2014 to 626.1 in the first half of 2019 as in Table 4. And that of PR filers has increased by 129.2 points during the same period. Meanwhile, the credit score change of non-filing credit defaulters was insignificant due to continued delinquency after their credit scores fell sharply in 2015.

4.1.3 Annual income change by groups. Table 5 shows the change in annual income by groups between 2014 and 2019 [19]. The annual income of the DMP users has increased by ₩12.96m (79.3%) between 2014 and 2019. And that of PR filers has gone up by ₩13.57m (97.4%) during the same period. The annual income of non-filing credit defaulters has increased by ₩3.38m (13.3%) for five years. Although the annual income of DMS groups in 2014 was lower than the 2nd quintile national income, their income rose higher than or similar to the 2nd quintile national income in 2019.

	DMP users		PR filers		Credit defaulters	
	Mean	Sta dev	Mean	Sta dev	Mean	Sta dev
Age	45.4	10.6	43.0	9.3	49.6	12.6
Credit scores	566.4	134.0	492.9	72.6	530.9	144.9
No. of credit defaults	0.84	2.08	1.30	2.74	0.38	1.45
Amount of credit defaults	6,201	116,609	11,525	87,051	19,707	616,839
Longest overdue days	62.0	242.6	72.7	259.0	67.3	284.2
No. of unsecured	1.29	1.48	2.27	1.92	0.39	0.87
Amount of unsecured	6,443	12,443	14,679	26,796	3,559	24,996
No. of secured	0.17	0.55	0.22	0.58	0.09	0.49
Amount of secured	4,429	30,622	4,424	22,358	4,729	53,069
No. of subprime unsecured[a]	1.18	2.17	1.93	2.53	0.24	0.87
Amount of subprime unsecured	7,281	133,128	22,116	408,665	5,160	582,704
No. of uncanceled guaranties	0.06	0.28	0.07	0.31	0.12	0.45
Amount of uncanceled guaranties	2,023	50,906	2,345	23,661	32,658	661,139
Days elapsed from initial credit opening	3,223	2,699	4,619	2,565	1,901	2,911
No. of credit cards	0.89	1.25	1.13	1.35	0.31	0.89
Recent days of credit card issuance	1,559	1,592	2,131	1,319	1,054	1,865
Spending of credit card in 6 months	1,238	4,725	226	1,944	710	4,027
Spending of debit card in 6 months	1,863	3,331	2,825	23,048	769	2,394

Note(s): [a]A subprime unsecured loan means borrowings from financial companies such as saving banks, installment financial companies, and loan businesses excluding banks and credit cards. Generally, it is not easy for consumers after DRPs with lower credit ratings to access banks to get borrowing, so they would use savings banks or loan businesses with the highest interest rates when they need to urgently pay for their daily expenditures
(Unit: number, days, ₩1,000)
Source(s): Figure by authors

Table 3.
Summary statistics of DMS users and credit defaulters

	2014	2015	2016	2017	2018	2019[†]
DMP users	484.1	520.3	549.0	607.1	615.9	626.1
		(7.5)	(5.5)	(10.6[a])	(1.4)	(1.6)
PR filers	421.9	480.9	490.9	504.0	527.5	551.1
		(14.0)	(2.1)	(2.7)	(4.7)	(4.5)
Non-Filing	617.5	509.3	518.3	527.0	532.5	534.7
Credit Defaulters		(−17.5)	(1.8)	(1.7)	(1.0)	(0.4)

Note(s): [†]Data for the second half of every year, but data for the first half of 2019 only; [a]The credit score has to rise significantly in the second half of 2016 due to the deletion effect of DMP public record information. However, the credit score increase of DMP users shows the highest in 2017 because the delinquency rate among DMPusers for 8 years is about 28%, of which 50% occurs within the initial 2 years
(Unit: points, %)
Source(s): Table by authors

Table 4.
Credit score change by groups

	2014	2019	Increase
DMP Users	1,633.0	2,928.6	1,295.6(79.3)
PR Filers	1,392.9	2,749.6	1,356.7(97.4)
Non-Filing Credit Defaulters	2,530.8	2,868.6	337.8(13.3)
2nd quintile National Household Income[†]	2,355.0	2,763.0	408.0(17.3)

Note(s): [†]Data released in 2015 and 2020 by Statistics Korea
(Unit: ₩10 thousand, %)
Source(s): Table by authors

Table 5.
Change of annual income between 2014 and 2019

4.2 Research methods

This study uses the difference-in-difference (DID) model and panel regression analysis to assess the policy performance based on the credit score and annual income of the DMS groups compared to those of non-filing credit defaulters.

4.2.1 Difference-in-difference (DID). The DID methodology is often used to examine the effect of a specific policy treatment through the performance comparison before and after policy implementation in situations when certain groups are exposed to a treatment and others are not. Under the assumption that the common trend holds, the DID estimation using iterative cross-sectional data can be obtained by estimating the regression model (Woo and Kim, 2020).

The regression model used in this paper is as follows.

$$y_{i,t} = \alpha + \beta_1 DEBT_i + \beta_2 TIME_t + \delta DEBT_i \times TIME_t + e_{i,t} \quad (1)$$

Where:

$y_{i,t}$ represents the credit score or annual income of the DRP user and the non-filing credit defaulter i at time t.

$DEBT_i$ is a dummy variable that has 1 if overburdened debtor i belongs to the group that received DMS (treatment), and 0 if the debtor is the non-filing credit defaulter group (control).

$TIME_t$ is a dummy variable with a value of 1 when observed after receiving debt relief, and 0 when observed in the second half of 2014 before receiving debt relief.

α is constant term.

β_1 is the specific effect of DMS group and non-filing credit defaulter group.

β_2 is the time trend common to DMS group(treatment) and non-filing credit defaulter group(control).

δ is the true effect of DMSs

$e_{i,t}$ is a random, unobserved "error" term that contains all determinants of y which this model omits. The purpose of the DID regression model in this paper is to find a good estimate of β_2, δ.

4.2.2 Panel data regression. As the materials used in this study are panel data that has been collected over several periods of time, a panel regression model is used. This article assumes the following panel regression model.

$$Y_{i,t} = a + \beta_1 X_{i,t} + \beta_2 D_i + u_i + e_{i,t} \quad (2)$$

for i = 1,2, ..., n and t = 1,2, ..., T.

Where:

$Y_{i,t}$ represents the credit score of the DMS user and the non-filing credit defaulter i at time t. D_i represents a dummy variable that has 1 if overburdened debtor i belongs to the group that received DMS (DMP and PR), and 0 if the debtor is the NFCD group. When comparing DMP and PR groups, D_i represents a dummy variable that has 1 if the debtor i is the group that received DMP, and 0 if the debtor i belongs to the PR group. $X_{i,t}$ is the financial activity variable of debt-ridden consumer i at time t. α is a constant term. β_1 is the estimation coefficient, which represents how each financial activity variables affect the credit score of an overburdened debtor. β_2 is the estimation coefficient of the dummy

variable. u_i is the individual residual which is the characteristic of debt-ridden consumer i and remains at all times. $e_{i,t}$ is the residual as a whole where the residual is a combination of cross-section and time-series. i is all panel debt-ridden consumers. t is the number of time periods.

Although the panel regression analysis in this article has to be analyzed by a fixed-effect model following the result of the Hausman test [20], there was a problem in that the results were not derived when analyzing the difference in credit scores between groups using dummy variables. Therefore, we analyze the difference in credit scores between groups using a random-effect model [21].

5. Empirical analysis

5.1 Research hypothesis

H1. The credit scores of DMS users will be higher than those of credit defaulters who do not apply for the DMS because they can discharge the partial amount of their past debts by the DMS. Also, DMS users will increase their annual income through active participation in the labor market because they have strong incentives for a fresh start through DMS.

H2. The credit scores of PR filers will be higher than those of the DMP users. This is expected because the principal reduction for PR filers is much more than that of the DMP users, and the remaining debt repayment period for PR filers is relatively shorter than that of the DMP users.

5.2 The result of empirical analyses

5.2.1 Difference analysis results of credit scores by groups. First, using the DID analysis method, we compare and analyze the change difference in credit scores between the DMS groups and non-filing credit defaulters, and between the DMS groups themselves. Second, the analysis results of the change difference in credit scores between the DMS groups and non-filing credit defaulter group by a random-effect model using dummy variables are also presented for reference.

5.2.1.1 DID results for credit scores. *5.2.1.1.1. DMP users versus non-filing credit defaulters.* The credit score of DMP users has significantly increased by 144.4 points more than that of non-filing credit defaulters from the second half of 2014 to the second half of 2015. The credit scores between DMP users and non-filers significantly widened to 224.8 points from the second half of 2014 to the first half of 2019. This result is because the credit score of DMP users has steadily increased due to financial and economic activities such as using a check card, repaying residual debts, and income increase. However, the credit score of non-filing credit defaulters has barely risen due to their continued debt delinquency and the limitations of normal financial activities. Meanwhile, the common trend (β_2) of credit scores of DMS (DMP and PR) users and non-filing delinquents has eased from −108.2 points in the second half of 2015 to −82.8 points in the first half of 2019 compared to the second half of 2014. This shows that the credit score of non-filing credit defaulters is insignificant, but it is on an upward trend from 2016. *5.2.1.1.2. PR filers versus non-filing credit defaulters.* The credit score of PR users has significantly increased by 167.2 points more than that of non-filing credit defaulters between the second half of 2014 and the second half of 2015. The credit scores between PR users and non-users were statistically significant and continuously expanded by 212.0 points in the first half of 2019. In short, these results mean that it is much more effective for overly indebted consumers to use DMS than to not apply for DMS to improve credit scores, which is indispensable in today's economic and financial life.

5.2.1.1.3. DMP users versus PR filers. Table 6 shows that from the second half of 2014 to the second half of 2015 and 2016, the credit score increase of DMP users was by 22.8 points and 4.03 points lower than those of PR filers, respectively. These are analyzed because the debt principal discharge ratio (24.7% [22] on average of the DMP is much lower than that (48.6% [23] on average) of PR in 2014. However, the credit score increase of DMP users was by 40.9 points, 26.2 points and 12.7 points, respectively, more than that of PR filers from the second half of 2017 to the first half of 2019. This reversal phenomenon seems to be because of the credit counseling [24] effect provided by CCRS and the short retention period of public record information of DMP compared to that of PR, even though DMP's debt reduction ratio in 2014 was much smaller than that of PR. Meanwhile, the common trend(β_2) of credit scores of DMP and PR users has expanded from 59.0 points in the second half of 2015 to 129.3 points in the first half of 2019, compared to the second half of 2014. This is because the credit scores of DMS users have continued to improve since the DMS. On the other hand, as can be seen in Table 4, there is a large difference in credit scores among the DMP, PR and NFCD groups in the second half of 2014. Since the credit score of the NFCD group, which is a control group, is significantly larger than that of the DMP and PR groups, there may be distortion in the DID analysis result. So, it is necessary to verify robustness after excluding outliers at both ends.

5.2.1.2 Panel regression results of credit scores by groups. Since the above analysis results of differences between groups using DID method are only comparative analyses between two-time points, there is a limit in that all panel data information for the 10-time points during five years cannot be fully utilized. Therefore, it might be meaningful that if the panel regression model were applied using dummy variables for each group, all time-series information could be utilized for more effective analysis.

Table 7 delivers the summary of difference analysis results of credit scores by panel regression analysis. The overall credit score of DMS users is significantly 33.39 points higher than that of non-filing credit defaulters. The credit score of DMP users is significantly 53.89 points higher than that of non-filing credit defaulters. However, the credit score of PR filers is significantly 4.99 points lower than that of non-filing credit defaulters. This phenomenon seems

		DMP vs credit defaulters		PR filers vs credit defaulters		DMP users vs PR filers	
		Coef[†]	t	Coef[†]	t	Coef[†]	t
2015	δ	144.43	96.55***	167.22	114.71***	−22.79	−24.34***
	β_2[a]	−108.19	−102.28***	−108.19	−104.95***	59.03	89.19***
2016	δ	164.13	95.57***	168.17	104.62***	−4.03	−3.53***
	β_2	−99.16	−81.66***	−99.16	−87.24***	69.00	85.49***
2017	δ	213.61	105.08***	172.71	97.54***	40.90	27.68***
	β_2	−90.53	−62.99***	−90.53	−72.31***	82.18	78.67***
2018	δ	216.89	97.45***	190.67	96.64***	26.23	15.42***
	β_2	−85.04	−54.04***	−85.04	−60.96***	105.63	87.86***
2019	δ	224.79	95.88***	212.05	101.49***	12.74	6.83***
	β_2	−82.79	−49.94***	−82.79	−56.04***	129.27	98.00***

Note(s): [†]δ = true effect of treatment, β_2 = time trend common to treatment and control; [a]The negative β_2 coefficient value in the credit score change analysis of the DMS (DMP and PR) groups and non-filing credit defaulters group means that if the DMS users also did not use the DMS, their credit score at the time of comparison would have been lower than that in the second half of 2014, just like non-filing credit defaulters' group. Meanwhile, the positive β_2 coefficient value when comparing the credit score changes of the DMP and PR groups means that the credit scores of DMP and PR users would show a common increase trend compared to the credit scores in the second half of 2014. ***, **, * express the statistical significance at 1, 5 and 10% levels
Source(s): Table by authors

Table 6.
DID Results for credit scores between groups

to be because the credit scores of PR filers from the second half of 2014 to the second half of 2018 were lower than that of non-filing credit defaulters as seen in Table 4, even though the credit score of PR filers in the first half of 2019 was higher than that of non-filing credit defaulters. Meanwhile, the overall credit score of DMP users is significantly higher by 45.3 points than that of PR filers. This result means that DMP is much more effective in increasing credit scores than PR.

5.2.1.2.1. Robustness checks. The average credit scores of the three groups in the second half of 2014 as shown in Table 4 were from 421.9 points to 617.5 points, indicating a big difference in credit scores between the three groups. Accordingly, we conducted difference analyses on only the samples with credit scores between 400 and 499 points Credit Score Trends between 400 and 499 points [25] in the second half of 2014, excluding the extremes among credit scores of the three groups to check the robustness of the above empirical analysis results. The average credit scores of DMP, PR and non-users in the second half of 2014 were 446.2 points, 436.9 points and 459.8 points. We can see that the difference in average credit scores between all groups has largely narrowed.

5.2.1.2.2. DID results for credit scores. Table 8 shows that the credit score increase of DMS users is still greater than that of non-filing credit defaulters. However, the common trend(β_2) of credit scores of DMS users and non-filing credit defaulters was reversed from negative to positive, unlike those described above. This seems to be because the credit scores of non-filing credit defaulters after excluding extreme values also were small but continued to increase for five years.

Meanwhile, the credit score increase of DMP users was 22.3 points less than that of PR filers from the second half of 2014 to the second half of 2015. However, the credit score increases of

	All data		Data for credit scores 400 ~ 499 points	
	Coef	z	Coef	z
1,2 vs 3	33.39	29.64***	42.02	26.74***
1 vs 3	53.89	36.74***	48.84	24.42***
2 vs 3	−4.99	−3.79***	35.10	25.60***
1 vs 2	45.26	46.39***	19.50	19.00***

Note(s): †1: DMP Users, 2: PR Filers, 3: Non-Filing Credit Defaulters. ***, **, * express the statistical significance at 1, 5 and 10% levels
For detailed analysis, see Appendix 1~4
Source(s): Table by authors

Table 7. Panel regression results of credit scores by groups†

		DMP vs credit defaulters		PR filers vs credit defaulters		DMP users vs PR filers	
		Coef†	t	Coef†	t	Coef†	t
2015	δ	28.48	15.46***	50.79	39.13***	−22.31	−22.45***
	β_2	3.85	2.39**	3.85	3.33***	54.65	81.01***
2016	δ	46.28	19.64***	45.60	28.99***	0.68	0.54
	β_2	18.27	8.86***	18.27	13.04***	63.87	75.21***
2017	δ	106.33	32.95***	46.47	22.75***	59.86	35.22***
	β_2	28.92	10.23***	28.92	15.89***	75.39	65.35***
2018	δ	104.37	28.98***	60.03	22.45***	44.34	21.89***
	β_2	39.07	12.39***	39.07	16.40***	99.10	72.08***
2019	δ	111.52	28.01***	79.10	24.94***	32.42	13.92***
	β_2	43.33	12.43***	43.33	15.33***	122.44	77.47***

Note(s): †δ = true effect of treatment, β_2 = time trend common to treatment and control. ***, **, * express the statistical significance at 1, 5 and 10% levels
Source(s): Table by authors

Table 8. DID results for credit scores between groups

DMP users compared to the second half of 2014 showed higher than that of PR users since the second half of 2016. In other words, it was found that the credit score increase of DMP users was much larger than that of PR users compared to the previous analysis results.

5.2.1.2.3. Panel regression results of credit scores. As can be seen in the section of Data for Credit Scores 400–499 points in Table 7, the credit score of DMP users was higher than that of non-users. The credit score of PR users was higher than that of NFCDs, unlike when analyzing all data. The credit score of DMP users was still higher than that of PR users.

In conclusion, these results mean that it is effective for overly indebted consumers to use DMS rather than not use it to improve their credit scores, which are indispensable for today's economic and financial life. Meanwhile, it was found that DMP was more effective in improving credit scores than PR, despite the relatively low principal reduction ratio (24.7%) and the long residual debt repayment period. This seems to be because DMP users have improved their financial management skills such as credit score management through the credit counseling service provided by CCRS.

5.2.2 DID results for annual income by groups. Table 9 shows DID test results for annual income by groups between 2014 and 2019. The annual income increase of DMP and PR users was significantly higher by ₩9.58m, and ₩10.19m respectively than that of non-filing credit defaulters from 2014 to 2019. This finding can be analyzed as DMS performed its role as a reconstruction-type debt relief system as intended by inducing active participation in the labor market of overburdened debtors through partial discharge of past debts. Meanwhile, the annual income increase of DMP users was ₩0.61m lower than that of PR filers for five years.

5.2.2.1 Robustness checks. The annual incomes of the three groups in 2014 as shown in Table 9 were from ₩13.93m to ₩25.31m, indicating a big difference in annual incomes between the three groups. Accordingly, we conducted difference analyses on only the samples with annual incomes between ₩10m and ₩19.9m [26] in 2014, excluding the extremes among annual incomes of all groups to check the robustness of the above empirical analysis results. The average annual income of DMP, PR and non-users in 2014 were ₩15.58m, ₩15.94m and ₩16.09m each. We can see that the difference in average annual incomes between the three groups has largely narrowed.

The section of Data between ₩10m and ₩19.9m in Table 9 delivers that the annual income increase of DMS users was still higher than that of non-filing credit defaulters even though the increase was largely eased unlike those described previously. Meanwhile, the common trend(β2) of the annual income of DMS users and non-filing credit defaulters increased largely from ₩3.38m to ₩9.44m for five years after excluding extreme values. The annual income increase of DMP users was ₩1.90m lower than that of PR filers for five years.

		All data		Data between 1,000 and 1999	
		Coef‡	t	Coef‡	t
1 vs 3	δ	957.80	35.35***	130.19	1.34***
	β_2	337.74	17.63***	944.41	12.27***
2 vs 3	δ	1018.54	34.53***	319.68	3.37***
	β_2	337.74	16.19***	944.41	12.43***
1 vs 2	δ	−60.74	−1.98**	−189.50	−2.92***
	β_2	1356.28	62.62***	1264.09	28.04***

Note(s): †1: DMP Users, 2: PR Filers, 3: Non-Filing Credit Defaulters
‡δ = true effect of treatment, β_2 = time trend common to treatment and control. ***, **, * express the statistical significance at 1, 5 and 10% levels
(Unit: ₩10 thousand)
Source(s): Table by authors

Table 9.
DID Results for Annual Income by Groups†

In conclusion, it can be seen that DMS provided incentives for overburdened debtors to actively participate in the labor market and contributed to economic growth by creating added value.

6. Conclusion

This study shows evidence that DMS in Korea is much more effective in increasing the credit scores and annual income of overburdened debtors or credit defaulters. It can be seen that DMS provides incentives for debt-ridden consumers to actively participate in the labor market and also contributed to economic growth by creating added value. This finding empirically supports the argument that DMS provides fresh start opportunities to overburdened debtors and deter the loss of human capital by promoting them to work (Kang and Jung, 2013; Lee, 2015). We also present the finding that DMP is more effective in raising credit scores than PR due to the credit counseling provided by CCRS, even though the debt discharge ratio (24.7%) of DMP is much lower than that (48.6%) of PR in 2014. This finding is associated with the argument that DMP with credit counseling shows positive effects on financial health and financial management behaviors of credit defaulters (Elliehausen *et al.*, 2003, 2007; Kim *et al.*, 2003, 2005; Wang, 2010). However, the credit score of DMS users in the first half of 2019 (551.1–626.1 points) are at a very low level, making it difficult to access low-interest unsecured loans from banks. Therefore, DMS in Kores is still insufficient to support the return of debt-ridden consumers to normal financial life and provide opportunities for a fresh start.

This study's implications are as follows. First, government and financial institutions need to step up publicity so that honest but unfortunate overburdened or debt delinquents actively utilize DMS for a fresh start. Second, credit defaulters need to preferentially use DMP, which is more effective in improving credit rating and cheaper application fees than PR. Third, it is necessary to strengthen credit counseling like DMP for PR users and non-filing credit defaulters. Finally, the Korean government and court must review institutional improvements as the current DMS in Korea is still insufficient in supporting the fresh start of overburdened debtors. This study proposes the institutional improvement measures for enhancing the effectiveness of DMS in Korea as follows. (1) Review of introduction of mandatory credit education or counseling before PR. (2) Shortening the remaining debt repayment period of DMP (ex, 8–10 years → 5–8 years). (3) Strengthening credit counseling and financial education for overburdened debtors.

This study reveals that there was a limitation in analyzing only the annual income change between 2014 and 2019 because there were many omissions in the annual income data between 2015 and 2018. Therefore, in order to explore more effective system improvements in the future, data collection and additional research through in-depth interviews on changes in the income and financial situation of DMS users will be required.

Notes

1. DMS are rehabilitative DRPs based on the Debtor Rehabilitation and Bankruptcy Act and the Microfinance Support Act. DMS can be divided into PR (Chapter 13 in the United States) by the court and private DMP by the CCRS (For detailed differences between PR and DMP in Korea, please refer to Table 9 DMSs in Korea).
2. Oh (2014) argues that if the amount of household debt continues to rise and the structure of household debt deteriorates, the number of DMS filings would further increase.
3. Yi (2019) reports the findings that the default probability of household debtors will be 1.15%, which is about 50% (0.4% p) higher than the current default rate of 0.75%, based on the results of a stress test held with a 3% p increase of interest rate and 15% decrease of the house price.
4. The Financial Services Commission announced that the government and financial institutions decided to provide up to three more years of support for debt maturity extension and up to one more year of

deferral of principal repayment to support the soft landing of self-employed people affected by coronavirus disease 2019 (COVID-19), which had implemented since April 2020 (September 30, 2022)

5. The dropout rate of PR in Korea is 27.7% (Oh, 2014), which is much lower than 66% of Chapter 13 in the United States (Greene *et al.*, 2016). The dropout rate of DMP in Korea is also at 19.1–28% (Oh, 2014; Lee, 2022). Therefore, the repayment completion success rate of DMS in Korea is quite good compared to other countries such as the United States. That is, DMS in Korea has played a pivotal role as an effective reconstruction-type debt relief system rather than personal bankruptcy (Chapter 7 in the United States).
6. A credit score predicts how likely you are to pay back a loan on time. It is very important for consumers today to maintain good credit scores in order to lead normal economic and financial lives.
7. These are people who have overdue financial debts for more than 3 months and have a certain amount of income, so they can be eligible for the DMS.
8. The CCRS was re-launched as a statutory organization based on 「The Microfinance Support Ac」 in September 2016.
9. 「Debtor Rehabilitation and Bankruptcy Act」 Article 579.4. © The amount of living expenses necessary for the debtor and his/her dependents to lead a life worthy of human dignity, determined by the court by generally taking into account the minimum cost of living publicly notified under Article 6 of the National Basic Living Security Act, the age of the debtor, the age and number of his/her dependents, residential district, prices situation and other necessary matters.
10. DMP in Korea is quite different from DMP in the United States, which does not have a principal reduction, in that it can provide more substantial support to overburdened debtors through principal reduction (Hunt, 2005; Kang and Jung, 2013). Furthermore, if the DMP in Korea gets approval from over 50% of creditors, the agreement for debt settlement in the DMP shall be finalized, effectuating all creditors (Microfinance Support Act, Article 72). In the United Sates, creditors are not compelled to accept a proposed DMP (Hunt, 2005).
11. Sullivan *et al.* at Texas Law School led Consumer Bankruptcy Project in the United States, which was a large-scale empirical study on consumer bankruptcy (Chapters 7 and 13) that had been conducted five times from around 1980 to around 2015. They secured very wide data on consumer insolvency through five large-scale surveys and published the research results in papers and books, which had a great influence on consumer insolvency research.
12. The "fresh start" doctrine is succinctly summarized in the United States Supreme Court Ruling in 1934: "One of the primary purposes [. . .] is to relieve the honest debtor from the weight of oppressive indebtedness, and to permit him to start afresh [. . .]. From the viewpoint of the wage earner, there is little difference between not earning at all and earning wholly for a creditor [. . .] The new opportunity in life and the clear field for future effort [. . .]" (Livshits *et al.*, 2003).
13. Considering that the repayment period of DMP residual debt is 8 years, but PR filers are 5 years, which ends in the second half of 2019, the study period is limited to the first half of 2019 for a reasonable comparison of DMS performance.
14. 300,000 samples are 20,000 DMS (10,000 PR and 10,000 DMP) and 10,000 NFCD data at 10 points in each half of the period between the second half of 2014 and the first half of 2019.
15. Because it was sampled using the statistical program SAS, it can be said that it is a balanced sample by age, region, credit score, size and type of debt, etc. Also, to minimize sampling error due to the small sample size, 10,000 DMP, 10,000 PR and 10,000 NFCD samples were used. Accordingly, in the second half of 2014, the ratio of the sample to the population for each group of new entrants was 23.5%, 18.1% and 1.8%, respectively. There might be no difference in the population between DMP and PR because it is possible to apply for them only if overburdened debtors have monthly income above the minimum cost of living.
16. A personal credit score is an indicator (ranging from 1 to 1,000) provided via quantifying the possibility of a credit risk occurring, such as long-term delinquency above 90 days and within one year (NICE INFO).

17. NICE INFO estimates the annual earnings of DRP users and non-filing credit defaulters by its own analysis algorithm using available personal financial information such as repayment, debit and credit card spending, etc.

18. NICE INFO credit rating system (2020): 1st grade credit score, 900–1,000; 2nd grade, 870–899; 3rd grade, 840–869; 4th grade, 805–839; 5th grade, 750–804; 6th grade, 665–749; 7th grade, 600–664; 8th grade, 515–599; 9th grade, 445–514; 10th grade, 1–444. Personal credit rating has been changed from the previous credit rating system by grade 1st∽10th to the credit score system from 2021.

19. NICE INFO estimates the annual income for DMS users and credit defaulters based on repayments, usage of loans, credit and debit card spending, etc. However, it is difficult to estimate PR filers' annual earnings because their financial activities such as the usage of credit cards and borrowings are restricted by public record information on PR for five years. Therefore, this study only analyzes the annual income changes between 2014 and 2019, which NICE INFO describes as meaningfully analyzable data.

20. According to the Hausman test result, H_0 (There are no systematic differences between a fixed-effect estimator and a random-effect estimator in all four groups) has to be rejected. So, the fixed-effect model is suitable for this panel regression analysis.

Hausman Test Results by Groups

	Chi-Sq. Stat	Chi-Sq. d.f.	Prob>Chi-Sq
DMP	895.38	8	0.000
PR	7882.42	8	0.000
NF Credit Defaulters	290.10	8	0.000

21. Because the credit scores of DMPs, PRs, and NFCDs are different (i.e. the constant alpha may be random) and n (the number of samples) is much larger than t (the number of measuring time) in given panel data, this study uses a random-effect model even if the Hausman test suggests a fixed-effect model.

22. Average discharge ratio of DMP users in 2014 provided by the CCRS.

23. The average discharge ratio was calculated by the CCRS, using data from the CCRS's microfinance users among PR filers in 2014. For reference, the average discharge ratio for PR in 2012 was 46.5%, and that of DMP was 19.9% (Oh, 2014).

24. In addition to providing credit counseling to DMP users, the CCRS introduced a new credit welfare consulting service for DMP users in Sept 2019.57% of credit welfare consulting users were able to increase their credit scores, CCRS's press release (May 3, 2021).

25. Credit Score Trends between 400 and 499 by Groups

(Unit: points, %)

	2014	2015	2016.	2017	2018	2019*
DMP	446.2	478.0 (7.1)	510.3 (6.8)	581.0 (13.9)	589.0 (1.4)	600.8 (2.0)
Personal Rehabilitation	436.9	490.7 (12.3)	499.7 (1.8)	511.1 (2.3)	534.7 (4.6)	557.9 (4.3)
Non-Filing Credit Defaulters	459.8	463.7 (0.01)	478.1 (0.03)	488.7 (0.02)	498.9 (0.02)	503.2 (0.01)

Note(s): *Data for the second half of every year, but data for the first half of 2019 only

26. Annual Income Change between ₩10m and ₩19.9m by Groups

(Unit: ₩10 thousand, %)

	2014	2019	increase
DMP Users	1,593.7	2,668.3	1,074.6(67.4)
PR Filers	1,558.4	2,822.5	1,264.1(81.1)
Non-Filing Credit Defaulters	1,608.8	2,553.2	944.4(58.7)
2nd quintile National Income*	2,355.0	2,763.0	408.0(17.3)

Note(s): *Data released in 2015 and 2020 by Statistics Korea

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Appendix

The supplementary material for this article can be found online.

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