



Short- and Long-term Debt Restructuring through Equivalent Equations: The Case of a Company in the Services Sector

Arturo García-Santillán^{a,*}, J. Andrew Howe^b, Francisco Venegas-Martínez^c

ARTICLE INFO

Yayın Bilgisi

Received/Başvuru
28/10/2016

Accepted/Kabul
12/05/2017

Keywords:

Equivalent Equations
Debt Restructuring

ABSTRACT

This article presents a model for debt renegotiation for a company in the services sector. The motivation stems from reviewing the forecast cash flows for the years 2017 and 2018, which evidence illiquidity of the company for settling the promissory notes signed with its raw materials supplier. Within those two years are the maturities of 17 promissory notes, which the company sought to restructure into a new payment scheme to avoid the forecast illiquidity.

The *equivalent equations* technique was used to design a restructured series of debt payments that ensured equitable repayment to the creditor, spread over a longer time period. Most importantly, the restructured series of payments relaxed the stress on the debtor's cash flow, such that forecast liquidity was greatly improved.

1. Introduction

For various reasons people and companies may experience a loss of liquidity. It sets off a chain reaction because the impaired cash flows severely compromise payroll, tax compliance, payment of obligations to financial institutions and shareholders, and payment to suppliers and creditors, among others; see (García-Santillán & Vega-Lebrún, 2008) and (García-Santillán, Venegas-Martínez, & Escalera-Chávez, 2014). In addition to these results, any creditor that must institute debt collection procedures will face extra trouble and expenses, which may result in stress to their own liquidity. Furthermore, a firm that loses enough liquidity may be forced to file for bankruptcy protection, which entails further administrative headaches, expenses, and risks. Due to the widening impacts of illiquidity and their

severity, it is often in the best interest of both debtors and creditors to restructure debt arrangements when the debtor forecasts liquidity problems.

In this article, we detail the case of a real company that found itself in this position. We have been granted permission to publish this case study under the condition that the firm remain anonymous. Tables 1 and 2 show the quarterly cash flow statements for 2017 and 2018 forecast in June 2016. The company forecast a deficit in seven of the eight quarters. In these tables, it's easy to see why: there's a clear seasonal effect, with lower revenue in the second half of the year, while supplier debt payments don't exhibit a similar tendency to be lower. The details of these promissory notes are shown in Table 3.

* Corresponding author. Tel: +5 (229) 923 29 50 Ext. 6285, e-mail: agarcias@ucc.mx, arturogarciasantillan@yahoo.com.mx

e-mail addresses: agarcias@ucc.mx (A. García-Santillán), ahowe42@gmail.com (J.A. Howe), fvenegas1111@yahoo.com.mx (F. Venegas-Martínez)

^a UCC Business School, Universidad Cristobal Colon, Mexico

^b Independent Researcher, Riyadh, Saudi Arabia

^c Escuela Superior de Economía, Instituto Politécnico Nacional, Mexico

Table 1: Forecast 2017 Cashflows by Quarter (thousands)

	Q1	Q2	Q3	Q4	2017
Initial/previous balance	\$15,879	-\$228,324	-\$244,094	-\$90,184	\$15,879
Income					
Total sales	\$175,000	\$411,870	\$527,000	\$475,600	\$1,589,470
Tax (charge)	\$60,000	\$65,899	\$84,320	\$92,896	\$303,115
Client payments (recovery)	\$53,578	\$48,560	\$7,125	\$119,780	\$229,043
Total Income	\$304,457	\$298,005	\$374,351	\$598,092	\$2,137,507
Expenditures					
Payments to Suppliers	\$0	\$27,650	\$215,710	\$152,379	\$395,739
Operating expenses	\$118,243	\$102,570	\$123,540	\$141,520	\$485,873
Administrative expenses	\$297,240	\$285,000	\$71,250	\$311,000	\$964,490
Financial expenses	\$5,921	\$5,921	\$5,921	\$5,921	\$23,684
Investment (assets)	\$37,890	\$50,000	\$0	\$0	\$87,890
Tax (favor)	\$73,487	\$70,959	\$48,114	\$73,351	\$265,910
Total Expenditures	\$532,781	\$542,100	\$464,535	\$684,171	\$2,223,586
Surplus (deficit)	(\$228,324)	(\$244,094)	(\$90,184)	(\$86,079)	(\$86,079)

Source: Confidential correspondence with the company being analyzed.

Table 2: Forecast 2018 Cashflows by Quarter (thousands)

	Q1	Q2	Q3	Q4	2018
Initial/previous balance	-\$86,079	-\$266,417	-\$327,147	-\$112,711	-\$86,079
Income					
Total sales	\$351,200	\$411,786	\$471,492	\$627,500	\$1,861,978
Tax (charge)	\$56,192	\$65,886	\$75,439	\$100,400	\$297,916
Client payments (recovery)	\$71,382	\$41,500	\$61,240	\$89,170	\$263,292
Total Income	\$392,695	\$252,755	\$281,023	\$704,359	\$2,337,108
Expenditures					
Payments to Suppliers	\$145,729	\$127,655	\$15,000	\$0	\$288,384
Operating expenses	\$127,240	\$98,101	\$136,555	\$150,403	\$512,299
Administrative expenses	\$297,500	\$284,567	\$182,740	\$327,589	\$1,092,396
Financial expenses	\$6,178	\$7,200	\$7,200	\$7,200	\$27,778
Investment (assets)	\$11,654	\$0	\$0	\$47,500	\$59,154
Tax (favor)	\$70,812	\$62,379	\$52,239	\$85,231	\$270,660
Total Expenditures	\$659,113	\$579,902	\$393,734	\$617,923	\$2,250,671
Surplus (deficit)	(\$266,417)	(\$327,147)	(\$112,711)	\$86,436	\$86,436

Source: Confidential correspondence with the company being analyzed.

Table 3: Promissory Notes Due during Period in Question

Promissory Note	Days to Focal Date	Date Due	Quarter	Amount	Quarterly Total
1	75 before	22-Jun-17	Q2	\$27,650	\$27,650
2	60 before	7-Jul-17	Q3	\$49,560	
3	52 before	15-Jul-17	Q3	\$78,650	
4	29 before	7-Aug-17	Q3	\$50,000	
5	15 before	21-Aug-17	Q3	\$37,500	
6	45 after	20-Oct-17	Q4	\$11,879	\$215,710
7	75 after	19-Nov-17	Q4	\$28,500	
8	115 after	29-Dec-17	Q4	\$112,000	
9	120 after	3-Jan-18	Q1	\$24,589	
10	150 after	2-Feb-18	Q1	\$19,740	
11	168 after	20-Feb-18	Q1	\$29,800	\$152,379
12	181 after	5-Mar-18	Q1	\$41,600	
13	197 after	21-Mar-18	Q1	\$30,000	
14	245 after	8-May-18	Q2	\$31,856	
15	270 after	2-Jun-18	Q2	\$34,569	
16	297 after	29-Jun-18	Q2	\$61,230	\$145,729
17	320 after	22-Jul-18	Q3	\$15,000	\$127,655
					\$15,000

Source: Confidential correspondence with the company being analyzed.

2. Literature Review

2.1. Debt Restructuring

The study of Dedu, Lăzărescu, & Nitescu (2009) commented on the impact economic crises worldwide have had on the global economy, local economies, and especially companies who have faced severe problems with loans from financial institutions.

Financial institutions are often involved in circumstances of non-payment of their debtors. A major consideration for the creditor financial institution, is to minimize the financial stress to themselves associated with the debtor's financial straits, paying special attention to those payments which can be recuperated under any potential restructuring conditions. A further consideration is that the forced recovery of those loans not suitable for restructuring is a matter of concern; in addition to the associated administrative troubles and execution costs, there is a negative impact to goodwill. Rather than deal with the risks and troubles related to defaulting debtors, they will frequently restructure the

debt payments so as to rehabilitate their customer's balance sheet and prevent default.

Dedu, Lăzărescu and Nitescu (2009) suggest that the techniques for debt restructuring may be grouped into three categories:

- Restructuring payments through the definition of a new payment plan according the possibilities for debtor payment
- Cancelling part of the debt if the debtor cannot pay, considering the cost of a foreclosure incurred by the bank, being in this case a better strategy to discount part of the principal;
- Exchanging debt for stock, this should be accomplished by converting part of the debt for equity.

Manaligod (2005) analyzes the alternatives and implications of debt restructuring. The author makes the observation that many companies around the world have

experienced financial problems associated with crises, recessions, and economic setbacks. He also observes that by changing the terms of the debt, credit relationships can become safer and more convenient in such times of stress.

In the specialized literature on this matter, the restructuring of sovereign debt among countries has also been studied. On this topic, we highlight the works of Manaligod (2005), Das, Papaioannou & Trebesch (2012a), and Das, Papaioannou & Trebesch (2012b). Although these also relate to similar debt renegotiation models, other macroeconomic variables are involved, which are not exactly those used in the specific quantitative technique detailed here. In general, it is recommended for companies to take into account how potential debt restructuring affects specific business areas, such as the production unit. Additionally, the debtor must be aware of the debt restructuring effects on cash flow and key accounts of the financial position.

2.2. Debt Restructuring with Equivalent Equations

Several interesting methods for restructuring debt are presented in the literature. For example, restructuring with similar payments or payments with multiple amounts in rescheduled dates (Makoff, 2015) can be carried out by first evaluating the original debt, then a new scheme of payments, and finally the amount of each one, as mentioned by García-Santillán, Escalera-Chávez, & Venegas-Martínez (2014) and García-Santillán, Venegas-Martínez & Escalera-Chávez (2014). This is a high-level description of the *equivalent equations* technique. One characteristic of the equivalent equations technique is that both debtors and creditors can benefit from the debt restructuring. The lender receives additional interest in compensation for a longer time horizon, and the borrower benefits by relaxing immediate payment needs. Such an arrangement can improve financial management of liabilities enough to make the difference between solvency and default (García-Santillán, Rojas-Kramer, Venegas-Martínez, & López-Morales, 2016). An additional factor of restructuring can involve reducing the payment obligation of the debtor in exchange for an accelerated payment schedule. Here, the creditor will not have same earnings but will receive their capital sooner (García-Santillán & Vega-Lebrún, 2008). The benefits to the debtor should be obvious.

3. Case Study

This debt restructuring case was based on a focal date (FD) between the original promissory notes #5 & #6 – September 5, 2017. This partitioning is shown in the second column of Table 3, along with the number of days before / after for each promissory note. The debtor and creditor jointly agreed to restructure the debt so the existing schedule of promissory notes would be replaced

with a new schedule of equal payments due every 28 days after the focal date, with an interest rate of 3.5%.

We fit an equivalent equation model to the data in Table 3 to calculate the three moments of the restructuring: valuation of the original debt, valuation of the new payment scheme and the amount of each new payment. To index each overdue promissory note, we used a fixed interest rate of 8.5%, compounded every 28 days, including defaulting interest. A fixed interest rate of 5.5%, again compounded each 28 days, was used to discount promissory notes which had not yet become overdue. Throughout this section, we use the notation shown in Table 4. Figures 1 and 2 visually compare the original and restructured schedule of debts.

Table 4: Formula notations

Notation	Variable
fd	Focal date
bfd	Before focal date
afd	After focal date
$i_{d/m}$	Accurate interest rate (discounting) $(\sum i_d/365*m)$
$i_{indx/m}$	Accurate interest rate (indexing) $(\sum i_{indx}/365*m)$
P_1	1 th Promissory note
m	Capitalization
n	Time $(\sum t/m)$
V_{OD}	Original valuation
V_{NSP}	New scheme valuation
$Y_{1..j}$	Equal payments
E_{ir}	Effective interest rate
R_{ir}	Real interest rate

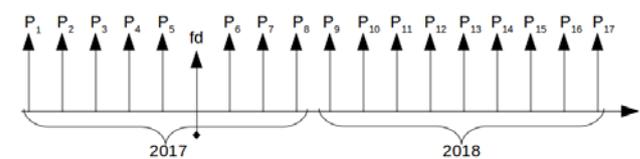


Figure 1: Original Debt Timeline

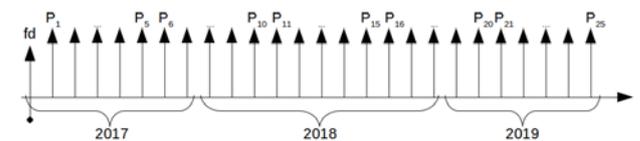


Figure 2: Restructured Debt Timeline

3.1. Debt Restructuring with Equivalent Equations – Formulation

According to García-Santillán, Escalera-Chávez, & Venegas-Martínez (2014) the algorithm that allows us to value the original debt with compounded interest is as follows:

1. Value the original debt, using the effective interest rate E_{ir} and real interest rate R_{ir} :

$$V_{OD} = \sum_{1\dots j} PN_{1\dots j.bfd} \left[1 + \left(\frac{E_{ir} * m}{t} \right) \right]^{t/m} + PN_{x\dots fd} + \frac{\sum_{1\dots j} PN_{1\dots j.afd}}{\left[1 + \left(\frac{R_{ir} * m}{t} \right) \right]^{t/m}} \quad (1)$$

If we utilize the accurate nominal interest rate $i_{indx/m}$ and accurate nominal discount rate $i_{d/m}$, we get:

$$V_{OD} = \sum_{1\dots j} P_{n_1} \left(1 + \frac{i_{indx}}{m} \right)^{\sum t/m} + \dots + P_{n_j} \left(1 + \frac{i_{indx}}{m} \right)^{\sum t/m} + P_{fd} + \sum_{1\dots j} \frac{P_{n_1}}{\left(1 + \frac{i_d}{m} \right)^{\sum t/m}} + \dots + \frac{P_{n_j}}{\left(1 + \frac{i_d}{m} \right)^{\sum t/m}} \quad (2)$$

2. Value the new payment scheme:

$$V_{NSP} = \sum_{1\dots j} 1_{1\dots j.bfd} \left[1 + \left(\frac{E_{ir} * m}{t} \right) \right]^{t/m} + 1_{x\dots fd} + \frac{\sum_{1\dots j} 1_{1\dots j.afd}}{\left[1 + \left(\frac{R_{ir} * m}{t} \right) \right]^{t/m}} \quad (3)$$

Again, using the accurate nominal interest rate (for indexing), and accurate interest rate (to discount), this becomes:

$$V_{NSP} = \sum_{1\dots j} \frac{D_{bfd1\dots j}}{1_{bfd_1}} \left(1 + \frac{i_{indx}}{m} \right)^{\sum t/m} + 1_{bfd_2} \left(1 + \frac{i_{indx}}{m} \right)^{\sum t/m} + \dots + 1_{bfd_j} \left(1 + \frac{i_{indx}}{m} \right)^{\sum t/m} + 1_{fd} + \sum_{1\dots j} \frac{D_{bfd1\dots j}}{1_{1\dots j}} \frac{1_{afd_1}}{\left(1 + \frac{i_d}{m} \right)^{\sum t/m}} + \frac{1_{afd_2}}{\left(1 + \frac{i_d}{m} \right)^{\sum t/m}} + \dots + \frac{1_{afd_j}}{\left(1 + \frac{i_d}{m} \right)^{\sum t/m}} \quad (4)$$

3. Compute the amount of each equal payment:

$$Y_{1\dots j} = \frac{V_{OD}}{V_{NSP}} \quad (5)$$

We can therefore compute the value of the original seventeen promissory notes according to the calculations worked out here from (2).

$$V_{OD} = \sum_{1\dots 5} P_{n_1} \left(1 + \frac{i_{indx}}{m} \right)^{\frac{\sum t}{m}} + \dots + P_{n_5} \left(1 + \frac{i_{indx}}{m} \right)^{\frac{\sum t}{m}} + \sum_{1\dots j} \frac{P_{n_6}}{\left(1 + \frac{i_{indx}}{m} \right)^{\frac{\sum t}{m}}} + \dots + \frac{P_{n_{17}}}{\left(1 + \frac{i_{indx}}{m} \right)^{\frac{\sum t}{m}}}$$

Expanding, filling in actual values, and reducing leads to:

$$\begin{aligned}
 V_{OD} &= \sum_{1...5}^{bfd} \$27,650(1.00652055)^{2.67857143} \\
 &+ \$49,560(1.00652055)^{2.14285714} \\
 &+ \$78,650(1.00652055)^{1.60714286} \\
 &+ \$50,000(1.00652055)^{1.07142857} \\
 &+ \$37,500(1.00652055)^{0.53571429} \\
 &+ \sum_{1...j}^{afd} \frac{\$11,879}{(1.00383562)^{1.60714286}} \\
 &+ \frac{\$28,500}{2.67857143} \\
 &+ \frac{\$112,000}{4.10714286} \\
 &+ \frac{\$24,589}{4.28571429} \\
 &+ \frac{\$19,740}{(1.00383562)^{5.35714286}} + \frac{\$29,800}{(1.00383562)^{6.0}} \\
 &+ \frac{\$41,600}{6.46428571} \\
 &+ \frac{\$30,000}{7.03571429} + \frac{\$31,856}{(1.00383562)^{8.75}} \\
 &+ \frac{\$34,569}{9.64285714} \\
 &+ \frac{\$61,230}{10.6071429} \\
 &+ \frac{\$15,000}{11.4285714}
 \end{aligned}$$

This then reduces to the coefficients of accumulation:

$$\begin{aligned}
 V_{OD} &= \sum_{1...5}^{bfd} \$27,650.00(1.01756148) \\
 &+ \$49,560(1.01402468) \\
 &+ \$78,650(1.01050018) \\
 &+ \$50,000(1.0068793) \\
 &+ \$37,500(1.00348788) \\
 &+ \sum_{1...j}^{afd} \frac{\$11,879}{(1.00617156)} + \frac{\$28,500}{(1.01030708)} \\
 &+ \frac{\$112,000}{(1.01584755)} + \frac{\$24,589}{(1.01654224)} \\
 &+ \frac{\$19,740}{(1.02072039)} + \frac{\$29,800}{(1.02323551)} \\
 &+ \frac{\$41,600}{(1.02505584)} + \frac{\$30,000}{(1.0273007)} \\
 &+ \frac{\$31,856}{(1.0340648)} + \frac{\$34,569}{(1.03760539)} \\
 &+ \frac{\$61,230}{(1.04144285)} + \frac{\$15,000}{(1.04472298)}.
 \end{aligned}$$

Finally, we obtain indexing amounts:

$$\begin{aligned}
 V_{OD} &= \sum_{1...5}^{bfd} \$28,135.57 + \$50,255.06 \\
 &+ \$79,475.84 + \$50,349.40 \\
 &+ \$37,630.80 + \sum_{1...j}^{afd} \$11,806.14 \\
 &+ \$28,209.25 + \$110,252.76 \\
 &+ \$24,188.86 + \$19,339.28 \\
 &+ \$29,123.31 + \$40,583.15 \\
 &+ \$29,202.74 + \$30,806.58 \\
 &+ \$33,316.13 + \$58,793.43 \\
 &+ \$14,357.87 \\
 &= \sum_{1...5}^{bfd} \$245,846.67 + \sum_{6...17}^{afd} \$429,979.52 \\
 &= \$675,826.18
 \end{aligned}$$

So then the fully discounted and compounded value of the debt is \$675.826.

After this, we should calculate a new scheme of 25 payments, based on (4):

$$V_{NSP} = \sum_{1..j}^{afd} \frac{X_{afd_1}}{\left(1 + \frac{i_d}{m}\right)^{\hat{a}t/m}} + \frac{X_{afd_2}}{\left(1 + \frac{i_d}{m}\right)^{\hat{a}t/m}} + \dots + \frac{X_{afd_{25}}}{\left(1 + \frac{i_d}{m}\right)^{\hat{a}t/m}}$$

In all cases X corresponds to each one of the payments. This expands to:

$$V_{NSP} = \sum_{1..j}^{afd} \frac{1_{afd_1}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_2}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_3}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_4}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_5}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_6}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_7}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_8}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_9}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{10}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{11}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{12}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{13}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{14}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{15}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{16}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{17}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{18}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{19}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{20}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{21}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{22}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{23}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{24}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}} + \frac{1_{afd_{25}}}{\left(1 + \frac{i_d}{m}\right)^{\sum t/m}}$$

Developing this gives us:

$$V_{NSP} = \sum_{1..j}^{afd} \frac{1_{afd_1}}{(1.0026849)^{28/28}} + \frac{1_{afd_2}}{(1.0026849)^{56/28}} + \frac{1_{afd_3}}{(1.0026849)^{84/28}} + \frac{1_{afd_4}}{(1.0026849)^{112/28}} + \frac{1_{afd_5}}{(1.0026849)^{140/28}} + \frac{1_{afd_6}}{(1.0026849)^{168/28}} + \frac{1_{afd_7}}{(1.0026849)^{196/28}} + \frac{1_{afd_8}}{(1.0026849)^{224/28}} + \frac{1_{afd_9}}{(1.0026849)^{252/28}} + \frac{1_{afd_{10}}}{(1.0026849)^{280/28}} + \frac{1_{afd_{11}}}{(1.0026849)^{308/28}} + \frac{1_{afd_{12}}}{(1.0026849)^{336/28}} + \frac{1_{afd_{13}}}{(1.0026849)^{364/28}} + \frac{1_{afd_{14}}}{(1.0026849)^{392/28}} + \frac{1_{afd_{15}}}{(1.0026849)^{420/28}} + \frac{1_{afd_{16}}}{(1.0026849)^{448/28}} + \frac{1_{afd_{17}}}{(1.0026849)^{476/28}} + \frac{1_{afd_{18}}}{(1.0026849)^{504/28}} + \frac{1_{afd_{19}}}{(1.0026849)^{532/28}} + \frac{1_{afd_{20}}}{(1.0026849)^{560/28}} + \frac{1_{afd_{21}}}{(1.0026849)^{588/28}} + \frac{1_{afd_{22}}}{(1.0026849)^{616/28}} + \frac{1_{afd_{23}}}{(1.0026849)^{644/28}} + \frac{1_{afd_{24}}}{(1.0026849)^{672/28}} + \frac{1_{afd_{25}}}{(1.0026849)^{700/28}}$$

Which reduces to:

$$V_{NSP} = \sum_{1..j}^{afd} 0.9973223 + 0.9946517 + 0.9919883 + 0.9893320 + 0.9866828 + 0.98440407 + 0.9814057 + 0.9787778 + 0.9761568 + 0.9735430 + 0.9709361 + 0.9683361 + 0.9657432 + 0.9631572 + 0.9605781 + 0.9580059 + 0.9554406 + 0.9528822 + 0.9503306 + 0.9477859 + 0.9452480 + 0.9427168 + 0.9401925 + 0.9376749 + 0.9351640 = \sum_{1..j}^{afd} 24.1480930$$

Finally, to obtain the amount of each equal payment value, we calculate Y according to (5):

$$Y = \frac{\$675,826.18}{24.1480930} = \$27,986.73$$

3.2. Financial Impact of Restructured Debt

In summary, the debt has been restructured from 17 unequal payments worth a total of \$678,826 into a stream of 25 payments of \$27,986, due in 28-day intervals, with a total value of \$699,668. This is shown in Table 5. Table 6 and Table 7 show the new forecast

cashflow statements for 2017 and 2018 based on the restructured debt.

Whereas the organization was previously expecting cash shortfalls in seven of the eight quarters, only the first two upcoming quarters are anticipated to be net losses. Additionally, notice that these two quarters have no debt obligations. This frees them to focus on other actions to reduce expenses – possibly temporarily – to mitigate these forecast shortfalls.

Table 5: Partial Schedule of Restructured Promissory Notes

Promissory Note	Date Due	Quarter	Amount	Quarterly Total
1	3-Oct-17	Q4	\$27,987	
2	31-Oct-17	Q4	\$27,987	
3	28-Nov-17	Q4	\$27,987	
4	26-Dec-17	Q4	\$27,987	\$111,947
5	23-Jan-18	Q1	\$27,987	
6	20-Feb-18	Q1	\$27,987	
7	20-Mar-18	Q1	\$27,987	\$83,960
8	17-Apr-18	Q2	\$27,987	
9	15-May-18	Q2	\$27,987	
10	12-Jun-18	Q2	\$27,987	\$83,960
11	10-Jul-18	Q3	\$27,987	
12	7-Aug-18	Q3	\$27,987	
13	4-Sep-18	Q3	\$27,987	\$83,960
14	2-Oct-18	Q4	\$27,987	
15	30-Oct-18	Q4	\$27,987	
16	27-Nov-18	Q4	\$27,987	
17	25-Dec-18	Q4	\$27,987	\$83,960
18-25	various (every 28 days)		\$223,894	

Source: Calculations detailed in section 3.

Table 6: Forecast 2017 Cashflows by Quarter (thousands)

	Q1	Q2	Q3	Q4	2017
Initial/previous balance	\$15,879	-\$228,324	-\$216,444	\$153,176	\$15,879
Income					
Total sales	\$175,000	\$411,870	\$527,000	\$475,600	\$1,589,470
Tax (charge)	\$60,000	\$65,899	\$84,320	\$92,896	\$303,115
Client payments (recovery)	\$53,578	\$48,560	\$7,125	\$119,780	\$229,043
Total Income	\$304,457	\$298,005	\$402,001	\$841,452	\$2,137,507
Expenditures					
Payments to Suppliers	\$0	\$0	\$0	\$111,947	\$111,947
Operating expenses	\$118,243	\$102,570	\$123,540	\$141,520	\$485,873
Administrative expenses	\$297,240	\$285,000	\$71,250	\$311,000	\$964,490
Financial expenses	\$5,921	\$5,921	\$5,921	\$5,921	\$23,684
Investment (assets)	\$37,890	\$50,000	\$0	\$0	\$87,890
Tax (favor)	\$73,487	\$70,959	\$48,114	\$73,351	\$265,910
Total Expenditures	\$532,781	\$514,450	\$248,825	\$643,738	\$1,939,794
Surplus (deficit)	(\$228,324)	(\$216,444)	\$153,176	\$197,713	\$197,713

Source: Calculations detailed in section 3.

Table 7: Forecast 2018 Cashflows by Quarter (thousands)

	Q1	Q2	Q3	Q4	2018
Initial/previous balance	\$197,713	\$79,144	\$62,108	\$207,585	\$197,713
Income					
Total sales	\$351,200	\$411,786	\$471,492	\$627,500	\$1,861,978
Tax (charge)	\$56,192	\$65,886	\$75,439	\$100,400	\$297,916
Client payments (recovery)	\$71,382	\$41,500	\$61,240	\$89,170	\$263,292
Total Income	\$676,487	\$598,315	\$670,279	\$1,024,655	\$2,620,900
Expenditures					
Payments to Suppliers	\$83,960	\$83,960	\$83,960	\$111,947	\$363,827
Operating expenses	\$127,240	\$98,101	\$136,555	\$150,403	\$512,299
Administrative expenses	\$297,500	\$284,567	\$182,740	\$327,589	\$1,092,396
Financial expenses	\$6,178	\$7,200	\$7,200	\$7,200	\$27,778
Investment (assets)	\$11,654	\$0	\$0	\$47,500	\$59,154
Tax (favor)	\$70,812	\$62,379	\$52,239	\$85,231	\$270,660
Total Expenditures	\$597,344	\$536,207	\$462,694	\$729,870	\$2,326,115
Surplus (deficit)	\$79,144	\$62,108	\$207,585	\$294,785	\$294,785

Source: Calculations detailed in section 3.

4. Concluding Remarks

In this article, we have examined the scenario of a company in the services sector who forecast seven consecutive quarters of negative cashflow. Wishing to avoid the consequences of defaulting on their debt obligations, the company opened negotiations with the creditor to restructure the debt and relieve some of the pressure on their financials. We have shown how the equivalent equations technique was a valuable solution which provided benefits to both debtor and creditor in this case. Both parties avoided the headaches of debt collection, bankruptcy, *et cetera*; the company was able to reduce their forecast illiquidity to only two quarters, and the creditor was promised complete repayment, with a premium to make up for the longer time schedule.

A characteristic feature of the debt restructuring model through equivalent equations is the bilateral agreement, with the debtor and the creditor expressing their perspectives. It is a practical method which is sufficiently flexible to allow both parties to negotiate interest rates, discounts, dates, and amounts for the new payment schedule. The several works of Dedu, Lăzărescu, & Nătescu (2009), García-Santillán, Escalera-Chávez, & Venegas-Martínez (2014), and García-Santillán, Venegas-Martínez, & Escalera-Chávez (2014) among others, have sought to set up this point of agreement between the parties, through the financial modeling with equivalent equations. In each one of those published works, the cases were resolved by using this quantitative technique. As a final comment we note that, although this model is not the only means to renegotiate debt, it is at least a scheme which seeks to

set up a mutual balance between the needs of both debtors and creditors.

ACKNOWLEDGMENTS: The author thanks also the referees for all comments and suggestion. Also our gratitude goes to Carlos Rojas-Kramer Ph.D for her support and suggestion in grammar and style in this paper.

References

- Das, U. S., Papaioannou, M. G., & Trebesch, C. (2012a). *Restructuring Sovereign Debt: Lessons from Recent History*. International Monetary Fund. Retrieved from <https://www.imf.org/external/np/seminars/eng/2012/financialcrises/pdf/ch19.pdf>
- Das, U. S., Papaioannou, M. G., & Trebesch, C. (2012b). *Sovereign Debt Restructurings 1950-2010: Concepts, Literature Survey, and Stylized Facts*. International Monetary Fund. Retrieved from <https://www.imf.org/external/pubs/ft/wp/2012/wp12203.pdf>
- Dedu, V., Lăzărescu, S. A., & Nătescu, D. C. (2009, November). Banking Restructuring Techniques in the Economical Crisis. *Theoretical and Applied Economics*, 11(540), 27-32.
- García-Santillán, A., & Vega-Lebrún, C. A. (2008, April). Reestructuración de la deuda mediante un factor común y la modelización con ecuaciones equivalentes. *Contribuciones a la Economía*, 2008-04.
- García-Santillán, A., Escalera-Chávez, M., & Venegas-Martínez, F. (2014). Process Debt Payment Trough the Ordinary Annuities and Gradient Series: Its Theoretical and Practical Implications. *Australian Journal of Basic and Applied Sciences*, 7(13), 227-235.

- García-Santillán, A., Rojas-Kramer, C., Venegas-Martínez, F., & López-Morales, S. (2016). Un modelo para gestionar la deuda a través de ecuaciones equivalentes. 6th International Conference and Doctoral Consortium organized in partnership by the ISEOR Research Center (Magellan, IAE Lyon, and University of Jean Moulin) and the "Organization Development and Change" Division and the "Management Consulting" Division. Lyon, France.
- García-Santillán, A., Venegas-Martínez, F., & Escalera-Chávez, M. (2014). Modeling Restructuring Debt with Equivalent Equations: Theoretical and practical implications. *American Review of Mathematics and Statistics*, 2(2), 91-106.
- Makoff, G. D. (2015). Debt reprofiling, debt restructuring and the current situation in Ukraine. Centre for International Governance Innovation. Retrieved from https://www.cigionline.org/sites/default/files/cigi_paper_no.63.pdf
- Manaligod, G. T. (2005, Jan). Debt restructuring: alternatives and implications. *Notes on Business Education*, 8(1), 1-6.
- Moreno-Garcia, E., García-Santillán, A., Bermúdez, A., & Almeida, P. C. (2015). Restructuring debt proposal in three hypothetical scenarios: Equal payments, different amounts and one unknown payment, different amounts and three unknown payments. *Journal of Progressive Research in Mathematics*, 4(1), 233-246.
- Sturzenegger, F., & Zettelmeyer, J. (2006). *Debt Defaults and Lessons from a Decade of Crisis*. Cambridge, Massachusetts: The MIT Press.