



ANALYTICS INVESTMENT ADVISORS, LLC

Models to Evaluate Lump Sum and Structured Settlements

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Judgments and settlements in personal injury lawsuits typically require the payment of money from a defendant to a plaintiff. Payment can be made in a lump sum, by a structured settlement, or by a combination of the two. This commentary: 1) explores the advantages and disadvantages of lump sum and periodic payments; 2) uses mathematical models to describe and analyze these concepts; and, 3) provides a conceptual framework for assessing the relative merits of these two non-mutually exclusive approaches.

Lump Sum Settlements

The traditional method of compensating an injured party is a lump sum paid in cash to the plaintiff,² either in fulfillment of a settlement agreement, or to satisfy a judgment. The amount of the lump sum will be the amount of money determined by the jury or by agreement of the parties, that will fairly and adequately compensate the plaintiff for past and future pain, disability, disfigurement, embarrassment, emotional distress, medical, hospital and health care costs, lost earnings, salary and value of work time, future earning capacity, spousal damages and other items.³ The amounts to attribute to past loss of income and medical expenses are reasonably easy to calculate by summing actual salary, wage loss and medical bills. The value of lost future income, future medical expenses and costs of long term care are more complicated to ascertain and typically require the knowledge of an expert.

Some of the cash from a lump sum settlement is usually disbursed to cover immediate expenditures by the injured party such as attorney's fees, litigation expenses, unpaid medical bills *etc.*, with the balance invested so as to provide the plaintiff with a source of capital and income to meet future living, medical and long term care needs. The plaintiff, alone or in conjunction with his financial advisors must decide how to manage and invest the remaining cash to protect the principal and provide income to meet anticipated future needs.

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² For convenience, we use the term "plaintiff" to refer to the injured party who is the judgment creditor, injured payee or beneficiary of a lump sum or structured settlement.

³ A list of some of the types of injuries that are compensable in personal injury cases may be found in the Minnesota Practice Series, Civil Jury Instruction Guides (CIVJIG) 91.10-.35, .50, .65 and 92.10.

Advantages of Lump Sum Settlements

The main advantage to the plaintiff of a lump sum settlement is exclusive control of the proceeds. For some plaintiffs, there is comfort in the knowledge that cash is readily available and accessible to meet living expenses, medical care costs, special purchases and distribution to beneficiaries. A lump sum award also minimizes the risk of subsequent insolvency of a defendant or defendant's insurer.

Disadvantages of Lump Sum Settlements

The theory underlying the concept of damages for future loss is that the lump sum will be prudently invested to insure that the total return from the investment and lump sum will be adequate to meet the plaintiff's needs for life or for a specified period of time.

The primary disadvantage of the lump sum is the burden on the plaintiff to wisely manage the settlement while resisting extravagant purchases and imprudent investments. The plaintiff must provide for future needs by projecting contingencies, weighing risk and accurately assessing the present value of the award at a discount rate that is reasonable and attainable in the market.

Structured Settlements

The term "structured settlement" is defined by Minnesota law as "an arrangement for periodic payment of damages for personal injuries established by settlement or judgment in resolution of a tort claim or for periodic payments in settlement of a workers' compensation claim." Minn. Stat. § 549.30 Subd. 12.

Although it has always been possible to pay off a judgment over time by making fractional payments and receiving partial satisfactions of the judgment, the concept of a structured settlement is relatively new, originating in Germany and gaining acceptance in the United States beginning in the 1960's.⁴ Such settlements frequently consist of the payment of a portion of the agreed upon settlement amount or judgment in cash and the purchase of an annuity for the benefit of the injured party. The cash portion of the structured settlement is typically used to cover immediate expenditures by the injured party (e.g. attorney's fees, litigation expenses, unpaid medical bills and capital expenditures such as home improvement or specialized medical or transportation equipment) while the annuity portion is equivalent to a pension, providing predetermined payments on specific dates for a duration that is established in the annuity contract. Structured settlement agreements⁵ frequently provide

⁴ Iain Goldrein and Margaret de Hass, *Structured Settlements, A Practical Guide*, Butterworths, London 1993, 3.

⁵ "Structured settlement agreement" means the agreement, judgment, stipulation, or release embodying the terms of a structured settlement, including the rights of the payee to receive periodic payments. Minn. Stat. § 549.30 Subd. 13.

that the structured settlement obligor,⁶ who is usually a defendant in the litigation or his insurer, will purchase an annuity from a life insurance company for the benefit of the injured party, the “payee.”⁷ Payments are made directly to the payee by the annuity issuer.⁸

Advantages of Structured Settlements

The principal advantage of a structured settlement is that the injured payee has the comfort of knowing that he or she will receive regular, periodic payments over a term of years or, in some cases, for life. Those with substantial injuries who cannot work, or who are likely to have substantial ongoing medical expenses know that there will be income in the future to replace lost wages or pay medical bills. Some annuities are indexed for inflation, providing a measure of protection from the anticipated declining purchasing power of the dollar in the future.

There is also a potential tax advantage to a structured settlement in that, while damages received as compensation for personal injury are generally not taxable, there is a tax on investment income generated by principal. Periodic payments, however, from an annuity established to compensate a payee for personal injuries are generally not taxable.⁹

Disadvantages of Structured Settlements

Annuities are complex insurance policies designed and developed by sophisticated insurance actuaries and underwriters. There are many types and forms of annuities such as fixed rate annuities, variable rate annuities, indexed annuities, deferred annuities, etc. each formulated with its own assumptions, experience ratings, commission structures, annual costs, riders, fees and charges.¹⁰ So while one may have the comfort and peace of mind gained by knowing that there will be future income to replace lost wages and pay future medical expenses, that sense of ease may be offset by the inflexibility of a structured settlement. Once in place, the payee is limited to the specific periodic payments provided by the annuity contract. One cannot unravel the structured settlement agreement or the annuity contract to take advantage of unique financial opportunities, such as withdrawing a portion of the principal to use as a down payment on a house. It is sometimes possible to sell and

⁶ “Structured settlement obligor” means the party that has the continuing periodic payment obligation to the payee under a structured settlement agreement or a qualified assignment agreement.” Minn. Stat. § 549.30 Subd. 14.

⁷ “Payee” means an individual who is receiving tax-free payments under a structured settlement and proposes to make a transfer of payment rights under the structured settlement. Minn. Stat. § 549.30 Subd. 8.

⁸ “Annuity issuer” means an insurer that has issued an annuity contract to be used to fund periodic payments under a structured settlement. Minn. Stat. § 549.30 Subd. 2.

⁹ See sections 104 and 130 of the Internal Revenue Code 26 U.S.C. §§ 104(a)(2), 130(c)(1)(D) and note that portions of personal injury judgments or settlements attributable to such things as lost wages or punitive damages are taxable. Some settlements must be apportioned accordingly. 26 U.S.C. § 101.

¹⁰ Stan Haithcock, “The Costs of Owning an Annuity”, *AAII Journal*, Vol. XXXV, No. 9. September 2013.

assign the payee's interest in a structured settlement annuity in exchange for a cash payment, but those cash payments are frequently heavily discounted, resulting in a substantial loss of the present value of the remaining payments.

Arithmetic and Geometric Means

While it has been common practice to use arithmetic averages when estimating the annual rate of return necessary to achieve a stipulated or desired outcome, the geometric mean, also known as the compound annual growth rate, is more appropriate for calculating proportional growth. The geometric mean was infrequently utilized in computing social statistics until 2010 when the United Nations Human Development Index began recommending this mode of calculation.¹¹

The geometric mean of growth over multiple periods produces the equivalent constant growth rate that yields the same final amount. The geometric mean of a data set is the n^{th} root of the product of the yearly observations. For example: $a^{1/n} = \sqrt[n]{a}$ where: "a" is the product of the yearly values and "n" is the number of data points.¹² The geometric mean applies only to positive numbers whose values are meant to be multiplied together, or are exponential in nature, such as data on the growth of human populations or the interest rates of a financial investment. Assume, for example, that a machine produces 100 widgets in year one, and 180, 210 and 300 widgets in years two, three and four. This would yield growth rates of 80%, 16.667% and 42.857% or an average yearly growth of 46.508% (80.0% + 16.667% + 42.857% divided by 3). However, if one starts with 100 widgets and applies a growth rate of 46.508%, the result is 314 widgets. The geometric mean for the same data calculates an average yearly growth of $1.442 = (1.80 \times 1.166 \times 1.428)^{1/3}$ which when applied to 100 widgets in period one results in the correct number of at the end of year four; namely 300.

Applying this methodology to the 20 year historic returns on investments for the S&P 500 and Nasdaq 100 generates the results shown in Table 1 where the arithmetic mean is demonstrated to overstate the geometric mean by 23.24% for the S&P 500, and 149.92% for the NASDAQ 100, the difference growing exponentially with an increase in the standard deviation. The arithmetic mean of a data set is always larger than the geometric unless all observations are equal, in which case the geometric and arithmetic means are identical. A further observation in Table 1 is that the geometric means for both the S&P 500 and NASDAQ indices are essentially equal; 6.21% and 6.51% for the S&P 500 and NASDAQ 100, respectively. This is not an unexpected outcome given the corresponding standard deviations for each index, and an implicit "buy-and-hold" strategy.

¹¹ http://en.wikipedia.org/wiki/Geometric_mean, "Application in Social Sciences", 6 [December 2013].

¹² Ibid, Applications; Proportional Growth", 5.

Comparative Models

The use of arithmetic averages when calculating projected return on investment *overstates* the yearly average growth, resulting in an economic projection that will leave the plaintiff short of funds to meet his or her needs for income and expenses over the relevant time period. The conceptual framework demonstrated in Table 2 takes this computational bias into consideration, while including all relevant medical considerations, taxes, special distributions, etc., to determine the relative merits of alternative lump sum and/or structured scenarios.¹³ There is an obvious advantage to performing this type of modeling before, rather than after, settlement discussions.

The models depicted in Tables 2 and 3 uses the Goal Seek function in Excel ® to answer the following types of questions.

Question 1: What rate of return is required on a \$1,500,000 structured settlement that provides an annual distribution of \$100,000, given projected inflation of 2.0% per annum? Answer: 5.32% (Table 2, Column 5)

Question 2: What rate of return is required on a \$1,500,000 cash settlement which provides an annual distribution of \$100,000, given projected inflation of 2.0% per annum, and taxes and management fees of 26% per year? Answer: 6.75% (Table 2, Column 9)

Question 3: What would be the required cash portion of a \$1,500,000 settlement and attendant rate of return necessary to provide an annual distribution of \$100,000, given projected inflation of 2.0% per annum, assuming the settlement is divided between an annuity with an annual rate of return of 4% and a self-administered cash portion? Answer: \$663,234 and 9.51% (Table 3, Column 9)

Conclusions

The above computations illustrate only a few of many settlement scenarios one can envision in determining the efficacy and relative merits of conceivable outcomes between structured and cash settlements. This approach can be easily expanded to incorporate most variables and assumptions that are unique to each situation.

Therefore, given that Medical costs will continue to increase, guaranteed pension incomes are scarce, interest rates are at historic lows, mortgage debt is common, and life expectancies are increasing, it is imperative to formulate an approach to settlement structures

¹³ The following projections employ arithmetic growth rates, which, while inconsistent with the recommended use of geometric means, is the only practical methodology for the comparisons contemplated given the uncertainty of future market volatility.

(and retirement planning in general) that is efficient and designed to produce an optimal amount of income for each dollar invested in each particular circumstance. This would seem to favor a long term perspective that: 1) does not commit an inordinate portion of one's portfolio to bonds; 2) has adequate liquidity for emergency funds; and, 3) has the potential of leaving a larger estate due to longer life expectancies. The thoughtful use of the above modeling techniques can be useful in understanding the implications, potential realities and efficacy of alternative outcomes. ¹⁴

¹⁴ "A New Generation Retirement Strategy" Pacific Life, 80060-13A, 8/18/2013.

Table 1
Historical Returns

1	2	S&P500				Nasdaq			
		3	4	5	6	7	8	9	10
Years	Year	Ticker \$inx	Investment Value	Arithmetic	Geometric	Ticker \$comp	Investment Value	Arithmetic	Geometric
				Mean	Mean			Mean	Mean
			\$10,000	7.97%	6.21%		\$10,000	13.98%	6.51%
1	1993	7.10%	\$10,710	\$10,797	\$10,621	10.60%	\$11,060	\$11,398	\$10,651
2	1994	-1.50%	\$10,549	\$11,658	\$11,281	-49.20%	\$5,618	\$12,991	\$11,345
3	1995	34.10%	\$14,147	\$12,587	\$11,981	42.50%	\$8,006	\$14,807	\$12,083
4	1996	20.30%	\$17,018	\$13,591	\$12,726	42.50%	\$11,409	\$16,876	\$12,870
5	1997	31.00%	\$22,294	\$14,674	\$13,516	20.60%	\$13,759	\$19,235	\$13,708
6	1998	26.70%	\$28,247	\$15,844	\$14,356	85.30%	\$25,496	\$21,924	\$14,600
7	1999	19.50%	\$33,755	\$17,107	\$15,247	102.00%	\$51,502	\$24,988	\$15,551
8	2000	10.10%	\$30,346	\$18,471	\$16,194	-36.80%	\$32,549	\$28,481	\$16,563
9	2001	13.00%	\$26,401	\$19,943	\$17,200	-32.70%	\$21,906	\$32,462	\$17,642
10	2002	23.40%	\$20,223	\$21,533	\$18,269	-37.60%	\$13,669	\$36,999	\$18,791
11	2003	26.40%	\$25,562	\$23,250	\$19,403	49.10%	\$20,381	\$42,171	\$20,014
12	2004	9.00%	\$27,862	\$25,103	\$20,608	10.40%	\$22,500	\$48,065	\$21,317
13	2005	3.00%	\$28,698	\$27,105	\$21,888	1.50%	\$22,838	\$54,783	\$22,705
14	2006	13.60%	\$32,601	\$29,266	\$23,248	6.80%	\$24,391	\$62,441	\$24,183
15	2007	3.50%	\$33,742	\$31,599	\$24,692	18.70%	\$28,952	\$71,168	\$25,758
16	2008	38.50%	\$20,751	\$34,118	\$26,226	-41.90%	\$16,821	\$81,116	\$27,435
17	2009	23.50%	\$25,628	\$36,837	\$27,855	53.50%	\$25,820	\$92,454	\$29,221
18	2010	15.10%	\$29,498	\$39,774	\$29,585	20.14%	\$31,020	\$105,377	\$31,124
19	2011	0.00%	\$29,498	\$42,945	\$31,422	-1.80%	\$30,462	\$120,106	\$33,150
20	2012	13.14%	\$33,374	\$46,368	\$33,374	15.91%	\$35,308	\$136,893	\$35,308
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		18.71%		\$492,571	\$399,692	41.28%		\$1,034,734	\$414,019
		(S.Dev.)		23.24%		(S.Dev.)		149.92%	

Table 2

Settlement Comparison

			Structure		Cash			
1	2	3	4	5	6	7	8	9
Years	Age	Year	Trust Needs	Present Value	Trust Needs	Trust Return	Taxes & Fees	Present Value
			2.00%	5.32%	2.00%	5.32%	26.00%	6.75%
1	65	2013	\$100,000	\$100,000	\$100,000	\$5,325	\$1,384	\$100,000
2	66	2014	\$102,000	\$96,843	\$103,384	\$5,505	\$1,431	\$96,843
3	67	2015	\$104,040	\$93,786	\$106,883	\$5,691	\$1,480	\$93,786
4	68	2016	\$106,121	\$90,825	\$110,501	\$5,884	\$1,530	\$90,825
5	69	2017	\$108,243	\$87,958	\$114,241	\$6,083	\$1,582	\$87,958
6	70	2018	\$110,408	\$85,182	\$118,107	\$6,289	\$1,635	\$85,182
7	71	2019	\$112,616	\$82,493	\$122,105	\$6,502	\$1,690	\$82,493
8	72	2020	\$114,869	\$79,889	\$126,237	\$6,722	\$1,748	\$79,889
9	73	2021	\$117,166	\$77,367	\$130,510	\$6,949	\$1,807	\$77,367
10	74	2022	\$119,509	\$74,924	\$134,927	\$7,185	\$1,868	\$74,924
11	75	2023	\$121,899	\$72,559	\$139,493	\$7,428	\$1,931	\$72,559
12	76	2024	\$124,337	\$70,269	\$144,214	\$7,679	\$1,997	\$70,269
13	77	2025	\$126,824	\$68,050	\$149,095	\$7,939	\$2,064	\$68,050
14	78	2026	\$129,361	\$65,902	\$154,141	\$8,208	\$2,134	\$65,902
15	79	2027	\$131,948	\$63,822	\$159,358	\$8,486	\$2,206	\$63,822
16	80	2028	\$134,587	\$61,807	\$164,752	\$8,773	\$2,281	\$61,807
17	81	2029	\$137,279	\$59,856	\$170,327	\$9,070	\$2,358	\$59,856
18	82	2030	\$140,024	\$57,966	\$176,092	\$9,377	\$2,438	\$57,966
19	83	2031	\$142,825	\$56,137	\$182,052	\$9,694	\$2,520	\$56,137
20	84	2032	\$145,681	\$54,364	\$188,213	\$10,022	\$2,606	\$54,364
			\$2,429,737	\$1,500,000	\$2,794,633	\$148,811	\$38,691	\$1,500,000

Table 3

Settlement Comparison

			Structure		Cash			
1	2	3	4	5	6	7	8	9
Years	Age	Year	Trust Needs	Present Value	Trust Needs	Trust Return	Taxes & Fees	Present Value
			2.00%	4.00%	2.00%	9.51%	26.00%	9.51%
1	65	2013	\$50,000	\$50,000	\$50,000	\$4,754	\$1,236	\$50,000
2	66	2014	\$51,000	\$49,038	\$52,236	\$4,966	\$1,291	\$47,701
3	67	2015	\$52,020	\$48,095	\$54,572	\$5,188	\$1,349	\$45,507
4	68	2016	\$53,060	\$47,171	\$57,012	\$5,420	\$1,409	\$43,415
5	69	2017	\$54,122	\$46,263	\$59,562	\$5,663	\$1,472	\$41,419
6	70	2018	\$55,204	\$45,374	\$62,225	\$5,916	\$1,538	\$39,514
7	71	2019	\$56,308	\$44,501	\$65,008	\$6,181	\$1,607	\$37,697
8	72	2020	\$57,434	\$43,645	\$67,915	\$6,457	\$1,679	\$35,964
9	73	2021	\$58,583	\$42,806	\$70,952	\$6,746	\$1,754	\$34,310
10	74	2022	\$59,755	\$41,983	\$74,125	\$7,047	\$1,832	\$32,732
11	75	2023	\$60,950	\$41,175	\$77,440	\$7,362	\$1,914	\$31,227
12	76	2024	\$62,169	\$40,384	\$80,903	\$7,692	\$2,000	\$29,791
13	77	2025	\$63,412	\$39,607	\$84,521	\$8,036	\$2,089	\$28,421
14	78	2026	\$64,680	\$38,845	\$88,301	\$8,395	\$2,183	\$27,114
15	79	2027	\$65,974	\$38,098	\$92,249	\$8,770	\$2,280	\$25,868
16	80	2028	\$67,293	\$37,366	\$96,375	\$9,163	\$2,382	\$24,678
17	81	2029	\$68,639	\$36,647	\$100,685	\$9,572	\$2,489	\$23,543
18	82	2030	\$70,012	\$35,942	\$105,187	\$10,000	\$2,600	\$22,461
19	83	2031	\$71,412	\$35,251	\$109,891	\$10,448	\$2,716	\$21,428
20	84	2032	\$72,841	\$34,573	\$114,805	\$10,915	\$2,838	\$20,443
			\$1,214,868	\$836,766	\$1,563,964	\$148,692	\$38,660	\$663,234
							Total	\$1,500,000