

ON PERSONAL INJURY LOSS: THE CASE OF MALAYSIA AND SINGAPORE¹

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Compensation awarded by the courts to plaintiffs in a personal injury or fatal accident action is usually in the form of a lump sum. The current practice of courts in Malaysia and Singapore in the determination of such lump sum awards uses the multiplier times multiplicand approach. In this paper, we examine the factors and problems raised by this approach. An alternative method which incorporates the effects of mortality directly in the calculation is presented. The effects of taxation and inflation are also discussed.

Pampasan yang dianugerahkan oleh mahkamah kepada plaintif dalam kes-kes kecederaan orang perseorangan atau kemalangan yang menyebabkan kematian selalunya diberikan dalam bentuk wang tunai sekaligus. Mahkamah di Singapura dan Malaysia hari ini menggunakan pendekatan pengganda darab pekali untuk menentukan jumlah anugerah tersebut. Artikel ini meneliti beberapa faktor dan masalah yang timbul dalam pendekatan sedemikian dan menyarankan satu cara alternatif yang mengambil kira kesan kematian secara langsung dalam pengiraan. Kesan-kesan pencukaian dan inflasi juga dibincangkan.

INTRODUCTION

Compensation awarded by the courts to plaintiffs in a personal injury or fatal accident action is usually in the form of a lump sum. The basis of the lump sum calculation is the recognition that money has time value. The current practice of courts in Malaysia and Singapore in the determination of such lump sum awards uses the multiplier times multiplicand approach. Essentially, the multiplicand is assessed by the courts to be the annual sum that represents the plaintiff's losses at the time of the trial or accident. The multiplier is determined by calculating

the period of the loss. Usually this is taken to be the difference between the normal retirement age and the age of the victim with allowances made for unpredicted life contingencies.

The focus of this paper is on the economic aspects of calculating the lump sum awards. It examines the factors and problems raised by the multiplier times multiplicand approach. An alternative method which incorporates the effects of mortality directly in the calculation is presented. Consideration will also be given to the outcomes of the lump sum determination under different interest rate and mortality bases. Examples on actual cases are drawn from Singapore and Malaysia. The effects of taxation and inflation are also discussed.

THE MULTIPLIER TIMES MULTIPLICAND APPROACH

In personal injury or fatal accident actions, the calculation of the award using the multiplier times multiplicand method is an attempt by the court to determine the amount of compensation that would place the suffering plaintiff in the same welfare level that the plaintiff would have enjoyed had the accident not happened.

In determining the lump sum award the court must first ascertain the annual sum which represents the plaintiff's losses at the date of the trial or accident, otherwise known as the multiplicand. Second, the court has to determine the multiplier by calculating the period of the loss which is usually taken to be the difference between the normal retirement age and the age of the victim allowing for unpredictable life contingencies. (Komesar, 1974; Hirsch, 1988; Quah, 1993).

For example, in Teo Tio Khiang & Anor. v Ooi Eng Teong (Singapore, 1986) [1987, M.L.J. 198] the second plaintiff suffered a severe brain damage as a result of a motor accident. At the time of the accident she was 21 years old and a mother of two children. She was working as a production operator in a factory with an average monthly salary of \$322.39 (between September 1980 and January 1981). Using a multiplicand of \$300 per month (or \$3,600 per annum) and a multiplier

of 16 years the court awarded her $\$3,600 \times 16 = \$57,600$ for loss of future earnings.²

In another case, Minachi & Anor. v Mohd. Yusof bin Zakaria (Penang, 1977) [1978, M.L.J. 256] the victim who was a labourer with a monthly salary of RM212 was killed in a collision between his bicycle and a motorcycle. At the time of the accident the victim was 35 years old married with a wife aged 28 years and three children aged 9, 11 and 12 years. The court assessed the multiplicand to be RM130 per month and allowed for the value of the multiplier to be 15 years after deducting for contingencies. However, instead of awarding general damages based on the multiplier times multiplicand approach directly which would have amounted to $RM130 \times 12 \times 15 = RM23,400$, the award granted was only RM16,192.28. Further discounts were made and the rate of interest used in the discounting was not set out by the judge.

Thus although the local courts use the multiplier times multiplicand method in calculating cash sum awards, there appears to be two variations in practice with regards to the treatment of the multiplier. They may be described as the "direct multiplier" and the "discounted multiplier" approach as illustrated by the previous two examples respectively.

Pursuant to the Civil Law (Amendment) Act 1984, the direct multiplier is the method to be used for such calculations. This Amendment places the current practice in line with British procedures.

SOME ISSUES ARISING FROM THE COURTS' COMPUTATIONS

In almost all cases, even including those after the Amendment Act 1984, the determination of the multiplier can be described as arbitrary; there are no rules involved except that courts often follow previous cases. This procedure does indeed represent a considerable simplification to the problem of fair compensation. For example, the most common choice of the multiplier is around 15 years irrespective of the age of the victim at the time of the accident. Thus, the courts do not allow for the effects of

mortality to enter into their calculation. This paper demonstrates how mortality can be directly included in the lump sum determination.

When the courts use the discounted multiplier method, the rate of interest that is used for the discounting is, in almost all cases, not set out by the judge. It is well known that the most important factor influencing present value calculations is the choice of an appropriate rate of interest. A high rate of interest, when used as the rate of discount, will result in a low present value. Thus it will seem reasonable that the basis of choosing the appropriate rate of interest should be made known.

A related problem that arises is that the courts do not make explicit any allowance for the taxation of the "expected stream of income" to be received by the plaintiff. In this connection, Creedy (1988) has shown that the treatment of taxation in such calculations is easily handled with a proportional tax system. Specifically, if the rate of tax is τ then the relationship between the gross rate of interest i and the rate of interest net of tax i' is:

$$(1) \quad i' = i(1 - \tau)$$

This means that discounting at a gross rate of interest of 10 percent allowing for a tax rate of 40 percent is consistent with the use of a net rate of interest of 6 percent.

It is clear that the cash sum awarded also depends on the assessment of the multiplicand. The current practice adopts the view that the plaintiff's losses of annual earnings remain constant over the years (Cashin, 1972; Burrows, 1987). No allowance is made for escalating earnings as well as inflation in prices during the future. As a result, the award paid to the plaintiff will be inadequate when compared to potential future earnings.

Mathematically, the lump sum award divided by the multiplicand equals the direct multiplier. With the current practice, one can only hope that when the court places a value on the multiplier all the factors that do impact on the calculations have actually been consciously considered.

The fact that judgments do not explain how the multiplier is derived is cause for concern (Tan et al., 1993).

ANNUITY CERTAIN CALCULATIONS: Taxation and Inflation

An annuity-certain is a series of payments made at regular intervals over a predetermined length of time. It is not a necessity for each payment to be of equal amounts. However, when payments are the same the evaluation of the annuity-certain can be readily done.

Consider an annuity where the payments of 1 are made at the beginning of each year for n years certain, as shown in the following diagram:



The present value of this annuity, denoted by $\ddot{a}_n$ is given by:

$$(2) \quad \ddot{a}_n = 1 + v + v^2 + \dots + v^{n-1}$$

where $v = 1/(1 + i)$ and i is the rate of interest per annum used in the discounting. It is common to call such a series of payments an annuity-due (Tan et al., 1993).

If taxation on a proportional basis is taken into account then the interest rate used in the discounting would be the net rate of interest i' as given by (1).

Analyses of compensation calculations are usually carried out assuming that the stream of earning losses are experienced at the start of each lost year as well as remaining constant throughout the period of loss. In reality, earnings are not paid yearly but usually monthly. Also, earnings

do escalate in line with price inflation and career promotion. It is fairly easy to allow for these two factors in the annuity calculations.

First, consider the case where the payments of $1/12$ are made at the start of each month for n years certain. Then:

$$(3) \ddot{a}_n^{(12)} = [1 + v^{1/12} + v^{2/12} + \dots + v^{n \cdot 1/12}] / 12$$

which from first principles is the present value of an annuity-due of 1 per annum payable monthly (i.e. each monthly payment is $1/12$) for n years certain at an effective rate of interest of i per annum. Again, if a proportional tax is considered, then evaluation of (3) would be at the net rate of interest.

The other modification considers the allowance made for escalation in the lost earnings. Assuming a constant rate of growth of earnings of e percent per annum, then the present value of the lost earnings of 1 per annum payable monthly in advance for n years certain at a rate of interest of i percent per annum is from first principles given by:

$$(4) \quad \begin{aligned} & [1 + v^{1/12} + v^{2/12} + \dots + v^{11/12}] / 12 \\ & + (1+e/1+i), [1 + v^{1/12} + v^{2/12} + \dots + v^{11/12}] / 12 \\ & + (1+e/1+i)^2 [1 + v^{1/12} + v^{2/12} + \dots + v^{11/12}] / 12 \\ & \cdot \\ & \cdot \\ & \cdot \end{aligned}$$

$$+ (1+e/1+i)^{n-1} [1 + v^{1/12} + v^{2/12} + \dots + v^{11/12}] / 12$$

$$= Y \ddot{a}_n \quad (\text{provided } i > e)$$

where $Y = (1 - v) / 12 (1 - v^{1/12})$

$$v = 1 / (1 + i)$$

$\ddot{a}_n | k$ = present value of an annuity-due of 1 per annum for n years certain at a rate of interest of k per annum where $(1 + k) = (1 + i) / (1 + e)$.

It can be seen from equation (4) that the award calculations allowing for earnings escalation and payments made more frequently than once a year can be easily performed as it involves nothing more than evaluating the present value of an annuity-due at an appropriate interest rate. Nowadays, such calculations could be easily done on computer spreadsheets.

For illustrative purposes, the two cases cited earlier will now be analysed based on the above discussion of annuities-certain. In the case of Teo Tio Khiang & Anor. v Ooi Eng Teong the judge used the direct multiplier of 16 years taking into account previous judgements. At the time of the accident, the age of the victim was 21 years. The period of loss should thus be $55 - 21 = 34$ years. From equation (3) it follows by definition that:

$$\ddot{a}_{34}^{(12)} = 16 \quad \text{at } i = 5.33 \% \text{ per annum effective}$$

In other words, by taking the period of loss to be the difference between the normal retiring age of 55 and the age of the victim, and discounting future earnings at a net effective rate of interest of 5.33% per annum, result in a multiplier of 16 years. Thus while in the actual case the judgement did not spell out the way in which the multiplier of 16 was calculated, we have altered the problem to one involving whether 5.33% is an appropriate rate of interest to adopt.

In the case of Minachi & Anor. v Mohd. Yusof bin Zakaria where the discounted multiplier was used with a multiplicand of \$130 per month and a multiplier of 15 years the discounting calculations would have been done at about 5.43% per annum as:

$$\$130 \times 12 * \ddot{a}_{15}^{(12)} = \$16,191$$

As a comparison the lump sum treating the lost earnings as yearly payments would be, at 5.43% per annum:

$$\$130 \times 12 \times \ddot{a}_{15} = \$16,586$$

If this yearly-payment approach is taken then the rate of interest used in the discounting would have been greater than 5.43% per annum. In fact, the rate would be around 5.85% per annum. As mentioned earlier, the judge did not spell out the interest rate used in the calculations nor the basis of any implicit choice.

If the direct multiplier approach is used in the Minachi & Anor. v Mohd. Yusof bin Zakaria case then the period of loss would be 20 years with the direct multiplier equal to 10.38 years. Again, from equation (3) it can be easily seen that:

$$\ddot{a}_{20}^{(12)} = 10.38 \quad \text{at} \quad 7.80\% \text{ effective per annum.}$$

Suppose the rate of interest had been 5.43% per annum, then

$$\ddot{a}_{20}^{(12)} = 12.37$$

so that the lump sum award would have been

$$\$130 \times 12 \times 12.37 = \$19,297.20$$

It is therefore clear that the current practice by the courts have been rather arbitrary. How the judge sets values for the multiplier and the implicit rate of interest used in the discounting is not explicitly stated. These factors indeed have a significant influence on the cash sum determination as can be seen from the above examples.

AN ALTERNATIVE METHOD BASED ON LIFE ANNUITIES

The extent of the arbitrariness in the award compensation calculations can be reduced by directly taking into account the effects of mortality.

This will involve the concept of a life annuity. The valuation method will need to bring together the survival probability of a person from any age to any other age and the operation of compound interest. Survival probabilities are easily obtained from a mortality table (also known as a life table).

A life annuity is a series of payments, usually of equal size, made periodically (yearly if not stated otherwise) provided a designated person, called the annuitant, is still alive. If the payments are made throughout the entire life of the annuitant it is called a whole life annuity. If the payments cease at the end of a specified period even though the annuitant is still alive, it is called a temporary life annuity. It is clear that temporary life annuities are relevant in cases involving personal injury loss and fatal accidents. In both these cases, the specified period will be the difference between the normal retirement age and the age of the victim at the time of the mishap. Application of life annuities will then directly allow for the chance of the victim, if the accident had not happened, to reach the normal retirement age. The present value of the stream of earnings lost over this period, directly allowing for mortality effects, can be easily calculated.

Suppose that x denotes the age of the victim at the time of the mishap and N is the normal retirement age. Let $\ddot{a}_{x:n}$ denote the present value of an n -year temporary life annuity-due Hof 1 per annum to a life aged x . In most cases the value of n will be equal to $N - x$. From first principles,

$$(5) \quad \ddot{a}_{x:n} = (l_x + v l_{x+1} + v^2 l_{x+2} + \dots + v^{n-1} l_{x+n-1}) / l_x$$

where l_x = the number of people alive at age x .

It follows from equation (5) that the computation of the temporary life annuity-due requires the selection of an appropriate mortality basis as well as an appropriate interest rate to be used for the discounting.

The situation where the payments are made more than once a year can be similarly handled. Let $\ddot{a}_{x:n}^{(m)}$ denote the present value of an n -

temporary life annuity-due of $1/m$ payable m times a year to a life aged x .
Then:

$$(6) \quad \ddot{a}_{x:n}^{(m)} = (l_x + v^{1/m} l_{x+1/m} + \dots + v^{n-1/m} l_{x+n-1/m}) / m l_x$$

Approximations will be needed to evaluate the above expression unless the mathematical formula for l_x is known. It is common to base the approximations on yearly annuity functions. For example, it can be shown that:

$$(7) \quad \ddot{a}_{x:n}^{(m)} = \ddot{a}_{x:n} - (m-1) (l_x - v^n l_{x+n}) / 2m l_x$$

The allowance made for escalation in lost earnings will now be considered. Assuming a constant earnings growth at a rate of e percent per annum, the present value of the lost earnings of 1 per annum payable in advance in the amount of $1/m$ for m -time for n years certain at a rate of interest of i per annum is given by:

$$(8) \quad [l_x + v^{1/m} l_{x+1/m} + \dots + v^{(m-1)/m} l_{x+(m-1)/m}] / m l_x$$

$$+ (1+e/1+i) [l_{x+1} + v^{1/m} l_{x+1+1/m} \dots + v^{(m-1)/m} l_{x+1+(m-1)/m}] / m l_x$$

$$+ (1+e/1+i)^{n-1} [l_{x+n-1} + \dots + v^{(m-1)/m} l_{x+n-1+(m-1)/m}] / m l_x$$

$$= \left[\sum_{t=0}^{n-1} (1+e)^t D_{x+t} \ddot{a}_{x+t:1}^{(m)} \right] / D_x$$

$$\text{where } D_x = v^x l_x$$

The annuity function in the preceding summation expression can be evaluated according to equation (7) at the rate of interest of i percent per annum.

EMPIRICAL RESULTS

In this section, using the *Minachi* case as an example, lump sum awards will be calculated based on the alternative methods presented in the previous section. Specifically, the multiplicand is \$1,560 per annum. In Table 1 the multiplier is determined according to equation (7) where the age variable, $x = 35$ years, for $n = 20$ years and over $m = 12$ payments per year. Table 1 provides a comparison of the lump sum awards calculated at various interest rates as well as different mortality assumptions.

The various mortality bases are as follows:

Basis A: Malaysian males assured lives 1977 to 1983

Basis B: Singaporean males assured lives 1977 to 1983

Basis C: British males assured lives 1967 to 1970

Basis D: English Life Table (Males) Number 14

Basis E: Australian Life Table (Males) 1960 to 1962.

These mortality tables are based on a wide range of mortality experiences. The intention is to ascertain how sensitive the calculations are to the choice of a suitable mortality basis.

Table 1: Minachi & Anor. v Mohd. Yusof bin Zakaria
Comparison of Lump Sum Award
under different mortality basis.

Interest Rates	Basis A	Basis B	Basis C	Basis D	Basis E
5.0%	\$19,582	\$19,693	\$19,665	\$19,583	\$19,390
6.0	18,136	18,234	18,209	18,136	17,966
7.0	16,854	16,942	16,919	16,855	16,703
7.5	16,268	16,351	16,329	16,269	16,126
8.5	15,193	15,267	15,248	15,194	15,066
9.5	14,231	14,299	14,282	14,234	14,119
10.5	13,373	13,432	13,416	13,374	13,271
11.5	12,600	12,653	12,639	12,601	12,508

It is evident that the interest rate assumption is more important than the mortality basis in these calculations. At any particular interest rate the lump sum awards under each of the mortality basis are not significantly different. On the other hand, under any mortality basis, the awards are very different at the various interest rates.

Using the method based on equation (7) with any of the above mortality basis, the amount of \$16,192.28 awarded to the plaintiff would have meant using a rate of interest of around 7.5% per annum.

Again using the Minachi case as an example, in Table 2 the multiplier is determined according to equation (8) with initial multiplicand of \$1,560 per annum. The lump sum awards are calculated under Basis A (Malaysian males assured lives 1977 to 1983) at various interest rates and earnings escalation rates of 2, 3 and 4% per annum.

From the results, it may be seen that if the earnings escalation rate is $e\%$, then the lump sum of \$16,192.28 awarded by the judge would have been obtained assuming an interest rate of around 7.5% plus $e\%$. This means that cash sum calculations ignoring earnings escalation and discounting at the rate of interest of $r\%$ is approximately equivalent to the case allowing for a constant rate of earnings growth of $e\%$ and discounting at $(r + e)\%$

rate of interest. Again, the proper choice of the interest rate should be noted.

Table 2: *Minachi & Anor. v Mohd. Yusof bin Zakaria*
Comparison of Lump Sum Award
under different earnings escalation rates

Interest Rate	2%	3%	4%
5.0%	\$22,995	\$25,006	\$27,253
6.0	21,170	22,952	24,941
7.0	19,561	21,146	22,910
7.5	18,828	20,324	21,988
8.5	17,487	18,823	20,307
9.5	16,295	17,492	18,819
10.5	15,232	16,308	17,498
11.5	14,281	15,251	16,32

CONCLUSIONS

This paper examines the factors and problems raised by the multiplier times multiplicand approach in determining lump sum compensation awards. It is suggested that the current practice by the courts are rather arbitrary. Essentially, the view may be taken that the value placed on the multiplier encompasses all the effects of the factors that have influence on its determination. The uneasiness with this view is that very little or no attempt is made to represent the basis of the choice of multiplier or the value of the interest rate if used as a discounting rate. For example, it is readily seen that mortality effects are not explicitly taken into consideration.

An alternative method which incorporates the effects of mortality in the award computations is presented. Also, this paper has tried to demonstrate the sensitiveness of the calculations to different interest rate and mortality assumptions. More importantly, the proper choice of an interest rate should be noted. The suggested method can be easily

extended to allow for likely escalations of future lost earnings. The widespread availability of computers means that these calculations are so simple to carry out.

Considerable subjectiveness will always enter into the calculation of award compensations. Thus, it is hoped that the proposed method is a step towards reducing if not removing some of the subjectiveness by allowing the relevant factors to be set out explicitly. Further research will lead to refining the method proposed as well as addressing more issues not yet examined here.

NOTES

- ¹ A previous version of this paper was presented at the Symposium on Law and Social Sciences, Singapore 6-8 August 1992. The authors wish to thank the referee for the helpful comments.
- ² Similarly in *Low Yoke Ying & Anor. v Sim Kok Lee & Ors.*, the deceased, aged 32, was a lieutenant in the Singapore Armed Forces Commandos. Taking into account of his prospects of being promoted to the position of Major, the court assessed the loss of future income to be \$215,000. This amount was derived from a multiplier of 14 years and an unspecified multiplicand.

In *See Ah Hwa & Anor. v Ong Hock Thiam & Anor.*, the court awarded \$61,200 as the loss of future earnings to the deceased, who was 22 at the date of accident. The multiplier used was 15 years and the multiplicand was \$340 per month.

In *Noorianti bte. Zainal Abidin & Ors. v Tay Lei Nge*, the future earning awarded to the first deceased was \$59,807. This was a discounted amount derived from a multiplier of 11 years and a multiplicand of \$600 per month.

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