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Original Sins of Insurance systems: The case of the Greek Occupational Risk Insurance Scheme, IKA-ETAM

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Abstract

This paper aims to estimate the cost of pensions, compensations and foregone contributions due to occupational accidents for the main Greek social security institution IKA-ETAM. Through this process, conclusions transferable to other occupational risk insurance systems are drawn.

Both prevalence and incidence approach are applied on analytical data for active and new occupational accident pensions and compensations of IKA-ETAM for 2007. Cost is estimated as the difference of all costs and benefits with and without the accident.

Prevalence approach leads to an estimate of €148,539,548.40 against an estimate of €77,707,206.98 with incidence approach. In both approaches, cost of temporary disability is estimated at €18,464,021.61 and foregone contributions (opportunity cost) account for 27% of total cost.

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Although wages raised, contribution and compensation rates remained stable and accidents decreased for IKA-ETAM contribution payers during last decades, the viability of the system is threatened. The reasons identified are a) the increase of the average time off-work per accident and b) the backload, due to the large number of accidents and pensions in the past.

Keywords: *Occupational Risk Insurance, Prevalence Approach, Incident Approach*

JEL Codes: *G22; G32*

1. Introduction

Social security systems, especially those directly or indirectly related to occupational risk, serve two main goals: fair distribution of relevant costs (sometimes in a way to provide incentives) and ensuring enough resources for decent provisions to insured individuals when needed. One of the reasons why these two goals are not easy to be served together is the temporal dispersion of costs. Current contributions aim to cover future and uncertain costs of the insured individuals; therefore even if they are fairly distributed among the contribution payers (individuals and enterprises), the level of contributions is not easy to be defined, as it requires knowledge of future costs, subject to uncertain and complex factors, unpredictable in some cases like the one examined here.

The prevailing factor in such cases, at the individual level, is time preference (Drummond et al. 2005); therefore pressure is towards the minimum possible contributions. In many cases, this pressure was not met at the institutional level by certain informed studies of future costs with sensitivity analysis. Therefore, contributions were settled to levels that were adequate for the present costs, but not adequate to cover the future costs of provisions for contribution payers when they need them, either they still contribute or not.

This paper attempts to illustrate this tendency in the Greek system of occupational risk insurance, whose features are characteristic of this situation. Due to the lack of a specialized institution for occupational risk insurance, the main social security institution for private sector employees IKA-ETAM bears the main part of the cost of workplace accidents and diseases, with provisions in medical care or in cash and pensions.

The vast majority of employees and almost half of the active Greek population are insured to IKA-ETAM. The institution is the main pension provider and also provides medical care (directly or through provisions in cash), rehabilitation and compensation for time off-work due to health impairment. There is also a different policy for workplace accidents (they are compensated from the first day of absence and there is a different sum of pension due to permanent disability if it is due to an occupational accident) but it is not truly applied for occupational diseases that are usually treated as "plain diseases". To balance these costs due to occupational accidents, IKA-ETAM settled an insurance premium (paid by the employer) equal to 1% of wage, applicable to all "non-office" employed workers (Decree 473/1961). Heavy duties are also subject to higher premiums both for employers and employees, as they lead to early retirement. Table 1 summarizes all compulsory contributions of IKA-ETAM as percentages of wage: first three categories apply to all workers, whereas two last apply to some workers only. An average of 29.15% of wage (worker's and employer's contribution) applies.

Table 1: Contributions of IKA-ETAM (% of wage)

	Employee	**Employer**	**Total**
Sickness medical services	2.15	4.30	6.45
Sickness provisions in cash	0.40	0.80	1.20
Pension	6.67	13.33	20.00
Occupational risk	-	1.00	1.00
Heavy/unhealthy duties	2.20	1.40	3.60

In this paper, the real cost of premature pensions, compensations and foregone contributions for IKA-ETAM due to occupational accidents, is estimated. Unfortunately, due to lack of data, medical-related (treatment, rehabilitation) cost could not be included in the estimation. This is also the case for occupational diseases that are also excluded from the analysis. However, even if these major items are excluded, some important conclusions for all relevant insurance schemes can be drawn.

The general aspect applied here was to define the economic impact of occupational accidents for IKA-ETAM (total cost) as the difference in costs and benefits between the situations with and without the accident; i.e. opportunity cost is also included.

To get a more accurate view of the situation, the calculation of costs took place with both approaches available in literature (Van Doorslaer & Bouter 1990, Freeman et al. 2001, Meerding et al. 2006): prevalence and incidence approach. Prevalence approach estimates the costs payable during the year of reference for all "active" cases, i.e. the current cost in the year of reference attributable to all accidents regardless to when they occurred. In contrast, incidence approach estimates all current and future costs (regardless to when they are payable) attributable to the accidents that occurred during the year of reference.

In a mature and stable insurance system, these two estimates should ideally coincide. However, this is not the case in most systems, either due to changes in the course of their reform or due to changes in workplace (employment shifting to the "safer" tertiary sector, reinforcement of legislation, improvement in technology, etc.) or in medical science (decrease of permanent disabilities or temporary disability time).

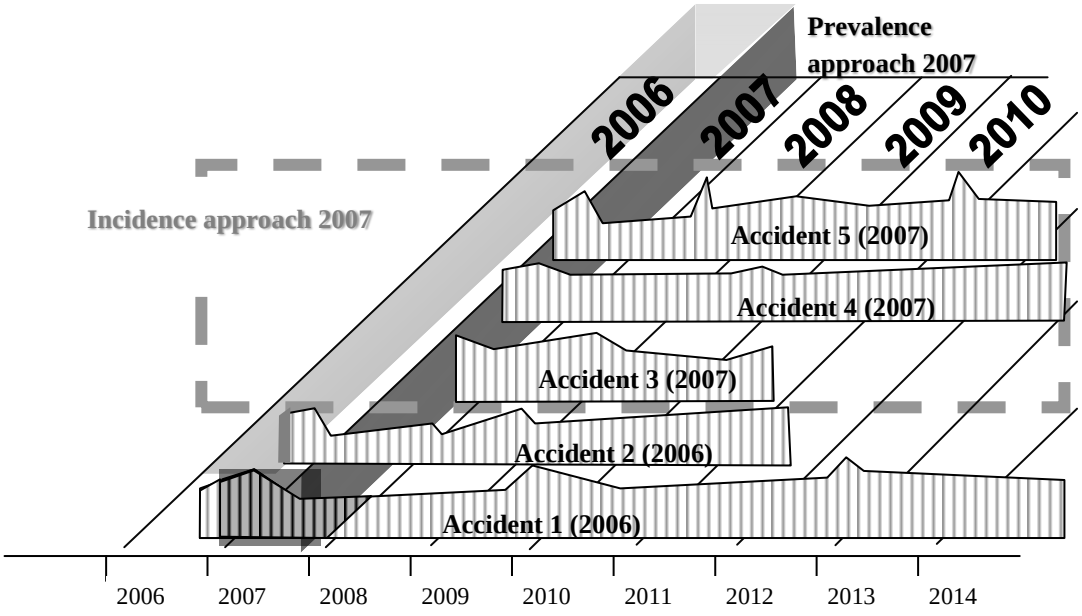

Figure 1: Prevalence and incidence approaches for 2007

2. Methodology

Raw data from IKA-ETAM for occupational accident pensions (all pensions active and new pensions awarded in the year of reference) and temporary disability compensations for 2007 were used. Generally, it is assumed that the worker will keep working with full insurance until the average retirement age (61 for males and 59 for females) if minimum threshold of insurance time (4,500 insured days) is completed, or until the completion of 4,500 insured days if his/her age is already above the average retirement age; his/her pension is estimated according to Table 1A (Appendix). Solidarity benefit "EKAS" (estimated according to Table 2.A in Appendix) for pensioners with low income is also added when it applies.

As mentioned above, the cost for IKA-ETAM is here estimated as the difference between the expenditure (and foregone benefits) with and without the accident. Therefore, the following cases stand:

Case 1: Death or permanent disability.

Incidents of this case lead to premature pension and they are examined together, because their cost is similar for IKA-ETAM.

In prevalence approach, the actual value (from accounts) of pensions paid (plus EKAS) is summed up for the cases when the worker is not yet entitled for normal pension, as in this case pension is absolutely attributable to the accident (there would be no pension otherwise). For the rest of the cases (over retirement age and with 4,500 insured days completed), the difference between the accident pension that the victim gets (from accounts) and normal pension (estimated according to Table 1.A in Appendix) that the victim would get (including EKAS when applicable), applies. This difference is the pension cost attributable to the accident.

Foregone contributions are also estimated based on the entitlement of normal pension. If both requirements (age and insured time) are satisfied, then no loss of contributions is assumed (the victim could have retired anyway), whereas if only one of them is satisfied, then the annual loss of contributions is assumed to be 29.15% (average percentage of contributions) of the daily wage of the victim times 300 (annual insured days).

For incidence approach, methodology estimation for pensions and foregone contributions is different. Initially, the age of the victim is subtracted from the

average retirement age (with completed 4500 insured days), i.e. when the victim would retire had no accident happened, in order to calculate the years while the worker will receive pension, whereas he/she would work had the accident not happened.

An annual raise of 3% is assumed for these years. Hence, the foregone contributions are estimated (29.15% times the future presumed daily wages). Moreover, based on these years, the sum of occupational accident pensions that the victim will receive until the year of normal retirement is estimated, i.e. total pension + EKAS, times the number of years.

For the years after retirement, the difference between normal pension and occupational accident pension needs to be estimated. In this case, difference is negative in many cases, when the victim-worker would retire after many years with a normal pension well above the occupational accident pension. Of course, the case when a normal pension well above the workplace accident pension is already entitled at the time of the accident needs to be removed, as the victim will prefer the normal pension; i.e. the accident impairs no cost for IKA-ETAM.

In order to estimate the duration of the pension, life expectancy at victim's age during the accident (and gender) is used. However, since the pension usually keeps being paid to other protected family members, the average extra duration of these pensions (estimated at 4.08 years, which is the average extra duration from historical data) is added. In other words, it is assumed that the pension will keep being paid for 4.08 years after the life expectancy of the victim.

The likelihood that the worker who would be capable for work had the accident not happened, will not find employment should also be taken into account, as in this case, the worker will not contribute. Therefore, foregone contributions are reduced by a percentage of 9%, which is an estimate of the unemployment rate for experienced workers (overall unemployment rate is higher because it includes the higher unemployment rate of first entrants; however workplace accident victims are by definition not first entrants).

The sum of occupational accident pensions until the age of normal retirement and the algebraic sum of pension differences (between normal pension and occupational accident pension) after this year, comprise the pension cost.

In both approaches, all benefits, including EKAS, are included. It has to be mentioned that if the pensioner does not receive EKAS, although his/her pension is low enough (obviously due to other unrelated income) EKAS is not included whatsoever.

Case 2: Temporary disability

This sort of disability is almost always completed within one year. Therefore, in both approaches (prevalence and incidence), the relevant cost is the same and it includes compensations and foregone contributions for the period of disability. Compensation cost is calculated simply by adding actual value (from accounts) of all compensations paid. For foregone contributions, the wage needs to be multiplied with 29.15% contribution rate times the days off-work for each case. According to IKA-ETAM regulation, temporal disability compensation is 50% of the daily wage plus 16.66% for the period under medical treatment and plus 5% for each extra protected person. For the first 15 days of absence all sums are halved (the other half is paid by the employer).

Due to the short time of disability there is no discount for unemployment.

3. Results

3.1 Prevalence Approach

In prevalence approach, the total cost of 13,795 active occupational accident pensions active currently is €106,417,220.98; however, only €12,369,770.14 (1,471 pensions) is about victims that were entitled to normal pension. Even in these cases, IKA-ETAM bears a total cost of €2,136,370.94 due to the difference between their occupational accident pension and the normal pension that they would receive had the accident not happened.

For the rest of 12,324 active pensions the whole pension is a burden for IKA-ETAM (there would be no pension had the accident not happened). The cost of these pensions is up to €94,047,450.84. Moreover, in these cases the pensioner would be in working age and would be working (if not unemployed) and paying contributions at 29.15% of his/her wage in average, which sums up to €33,891,705.01 annually.

The cost of compensations of temporary disability is €12,338,448.29 and reflects 606,497 days of compensation resulting to foregone contributions of €6,125,573.32. Hence the total cost in prevalence approach is €148,539,548.40.

Table 2: Estimation of cost with prevalence approach

	Permanent disability – death	**Temporary disability**	**Total**
Pensions - Compensations	96,183,821.78	12,338,448.29	108,522,270.07
Foregone contributions	33,891,705.01	6,125,573.32	40,017,278.33
Total	***130,075,526.79***	***18,464,021.61***	**148,539,548.40**

3.2 Incidence Approach

296 new pensions were awarded for 2007 with a total annual cost of €2,329,707, out of which 71 were disability pensions, 3 were age pensions and rest 222 were death pensions, of which 95 for fatal accidents and 127 were occupational accident pensions that shift beneficiary (next of kin) after the death (not directly related to the occupational accident) of the victim.

Of these pensions, in 76 cases the victim had fulfilled minimum requirements for normal pension; therefore extra pension due to occupational accidents is €151,255 for 2007. In rest 220 cases the whole pension is an extra burden for IKA-ETAM with a total annual cost of €2,178,452.21. In these cases there are also foregone contributions of €15,066,986.15 for the rest of the potential working years of the victims (discounted for an unemployment rate of 9%).

To sum up, the cost of future pensions (cost of pension up to the year of normal pension entitlement plus the difference from normal pension for the rest of the expected duration of the pension) is estimated at €44,176,199.22.

As mentioned before, the cost of compensations for temporary disability equals to the cost estimate of the previous approach. Therefore the total cost estimate is €77,707,206.98.

Table 3: Estimation of cost with incidence approach

	Permanent disability – death	**Temporary disability**	**Total**
Pensions - Compensations	44,176,199.22	12,338,448.29	56,514,647.51
Foregone contributions	15,066,986.15	6,125,573.32	21,192,559.47
Total	**59,243,185.38**	**18,464,021.61**	**77,707,206.98**

4. Discussion

In the period 1983-2007, Greece saw a continuous development: Gross Domestic Product (Purchasing Power Parity) raised by 180%, wages (subject to large inflation) were raised about 3 times (whereas the contribution rates of Table 1 remained stable) and employment increased by 27.4%. Meanwhile, number of accidents of IKA-ETAM drop by 67%. In other words, contributions were raising (more workers, higher wages, stable rates) while accidents were falling. This should normally lead to a surplus in the occupational risk insurance scheme; however this was not the case, as unfortunately happens in most insurance funds.

The reason behind this seemingly paradox can be illustrated based on the findings of previous Paragraphs. This illustration is easier for temporary disability, as in this case temporal dispersion of costs does not apply. Therefore, annual contributions should be equal or more than annual compensations, i.e.

$n \cdot 300 \cdot W_1 \cdot r \geq n \cdot p_1 \cdot d_1 \cdot W_1 \cdot c_1$, where:

300 is the number of insured days per year

n is the number of insured workers

W is the average daily wage

r is the contribution rate (stable)

p is the accident probability per worker for accidents with temporary disability (i.e. number of accidents per number of workers)

d is the average duration (days) off-work due to an accident

c is the compensation rate paid per day as a percentage of W

One first conclusion is that the number of insured workers (employment) and level of wages are irrelevant as both contributions and compensations are directly proportionate to them. Therefore this relation turns to:$300 \cdot r \geq p_1 \cdot d_1 \cdot c_1$,

Applying this to a posterior time, $300 \cdot r \geq p_2 \cdot d_2 \cdot c_2$.

To keep viable, $p_2 \cdot d_2 \cdot c_2 \leq p_1 \cdot d_1 \cdot c_1$, or $(p_1/p_2) \cdot (d_1/d_2) \cdot (c_1/c_2) \geq 1$.

As shown in Table 3.A (Appendix) the ratio of accidents between 1983 and 2006 is 3.02, which (combined with the increase of 27.4% in working population) makes a $(p_1/p_2)=3.85$. If the average duration per accident kept stable, since compensation rates policy kept unchanged, this would lead to a certain surplus situation.

However, as shown in Table 3.A (Appendix), the average number of days per accident have increased from 20.71 to 37.8, i.e. $d_1/d_2= 0.55$. Although this change would not overcome the ratio of $(p_1/p_2)=3.85$ itself, it also has a hidden effect. As mentioned above, compensation paid by IKA-ETAM for first 15 days is the half of the normal compensation. Therefore, when average compensated days per accident increase, the average cost will also increase. For example, 20.71 days account for (15/2)+5.71=13.21 full daily compensations, whereas 37.8 days account for (15/2)+22.8=30.5 full daily compensations. In other words, although compensation rates policy remained stable, c1/c2=0.43. This is also obvious from the average daily compensation per accident, which rose up almost 7 times (Table 3.A Appendix), whereas wages rose 3 times. The rest reflects the higher cost internalization for IKA-ETAM due to the higher average duration off-work

Although it is not easy to explain this large increase of days of absence per accident, it has to be emphasized that a similar trend also applies to some European countries (e.g. Sweden, France, Slovakia) but not to others (e.g. Finland, Belgium, Italy, Poland, Slovenia). However, in all countries with available data (LABORSTA), at least a slight increase in days per accident applies.

To sum up $(p_1/p_2) \cdot (d_1/d_2) \cdot (c_1/c_2)= 0.91$, which is lower than 1 that is required for a viable system. Concluding, as compensation and contribution are both proportionate to wage and number of days per accident increase, compensations are growing faster than contributions.

In the present estimation, the cost due to temporary disability accounts for 12.43% of the total cost (prevalence approach), which is comparable to the estimated cost in similar studies (10% Santana et al. 2006, 9.6% Leigh et al. 1997) in other countries. Therefore, the large part of costs falls to the permanent disability.

For permanent disability, the situation is not as easy to show analytically due to time dispersion of costs (here increase in employment and wages can be beneficial for the viability of the system), however some effects in the same direction will be shown.

Prevalence approach leads to a much higher estimate (almost double) than the incidence approach; i.e. the cost of new accidents is half than the cost of previous accidents.

There are 13,795 active pensions, whereas new occupational accident pensions for 2007 there were only 166 (the rest of the 296 were already existing pensions that shifted to another beneficiary), which accounts for a rate of 1:83. In other words, there are 83 times more occupational accident pensions in the system than the new pensions of 2007. This fact reflects that the system is back loaded, i.e. already overloaded with pensions of previous years, when the accidents were much more, as shown in Table 3.A (Appendix). This overwhelming cost cannot be balanced only by the annual contributions that are supposed to compensate the future cost of the accidents of the current year (according to incidence approach), i.e. the annual cost of 166 pensions, times the expected duration of them, which is the average life expectancy of current pensioners plus the extra duration of the pension (next of kin), i.e. 18.94+4.08=23.2 years. In other words, the system should normally support active pensions of 23.2 years like 2007, but it has to support pensions of 83 years.

Obviously, the annual cost of supporting the system (paying pensions and compensations) was much lower in previous years and it keeps rising incrementally as new pensions are added. This incremental cost was not sufficiently charged into the system through higher compensations in advance, i.e. while today's pensioners were still contributing.

Another conclusion of this paper is that opportunity cost (foregone contributions) is also an important parameter and it accounts for about 27% in both approaches. It is a hidden cost that increases significantly the total cost

when taken into account. However, this hidden cost is also rarely taken into account, especially in advance.

To sum up, temporal dispersion of costs, as well as hidden costs can easily lead to underestimation of the proper contribution rates and subsequently to inefficiency as the annual payable cost rises incrementally. Although the number of occupational accidents keeps decreasing in most countries due to a number of systematic reasons mentioned before, this will not be necessarily beneficial for the occupational risk insurance system if not properly designed. In the case of IKA-ETAM examined here, reported accidents kept falling in a period of continuous growth and increase of employment and wages. However, although the contribution rates were kept stable, this was not beneficial for the system, as backload and reverse trends (increase of wages also increased compensations and pensions) overcame the benefits.

Unfortunately, based on the existing data it was not possible to estimate the cost of medical treatment, rehabilitation, sequential diseases, etc., as well as the cost for occupational diseases, since IKA-ETAM truly burdens this cost, even under the umbrella of "plain disease". Although no comparisons between different countries and insurance schemes can be performed, to indicate order of magnitude, the cost of medical treatment has been estimated at about 20% (Corso et al. 2006), 29.6% (Miller & Galbraith 1995), 34% (Leigh et al. 1997), 36% (Leigh et al. 2001) until 41.5% (Shalini 2009) of the total cost of accidents (in a review of studies by Andreoni, 1986 the respective values are between 21% and 42%).

5. Conclusion

This study attempted to estimate the cost of pensions, compensations and foregone contributions due to occupational accidents for IKA-ETAM. The main conclusion, which is also reflected in the different cost estimation of different approaches (prevalence approach shows a cost twice as much as incidence approach) is that despite the reduction of accidents, the system is backloaded, which inevitable leads to inefficiency, as the cost is incrementally rising by new pensions and compensations.

This intensifies the shifting of costs to the society (tax payers, insured workers and new "innocent" enterprises) either directly (when a separate occupational risk insurance scheme exists) or indirectly (through social security, when there is no separate occupational risk insurance scheme), which is a counter-incentive for enterprises that in some cases can exceed existing

incentives, such as variable insurance rates (the portion is reducing but the whole is growing faster).

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